POPULAR
Computing
WEEKLY

Only 50p.

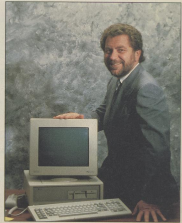
25 September-1 October 1986

Vol 5 No 39

October arrival for Spectrum Plus 2

AMSTRAD PC

Full review inside
Starts on p17



SOFTWARE

New fast Basic for the Atari STs

BMX Simulators and Asterix reviewed

NEWS DESK

The Amstrad threat to Atari: Tramiel speaks out – p12

Beyond's Star Trek: exclusive pictures

"GAMES AT THE SPEED OF LIGHT"...

LIGHT FORCE
SHOCKWAY RIDER

LIGHTFORCE is for **VENGEANCE**............
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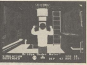

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ABC

How to submit articles Articles which are submitted for publication should not be more than 2000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here – so please do not be tempted. We cannot guarantee to return your programs – so please do not send your only copy. **Accuracy** *Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

No Plus 2 till October

THE Spectrum Plus 2 isn't now expected in the shops until mid-October, despite the fact that it was launched at the beginning of this month. At the launch of the machine at the PCW Show Amstrad said that it was "due in the British High Street later this month," but both WH Smith and Amstrad Distribution say it's not expected in the stores for another three weeks.

The delay is unusual for Amstrad, which doesn't usually announce machines until they're ready to go into the stores, and it's not clear if there's any problem with the machine.

As it is practically identical to the Spectrum 128 it's unlikely that there could be a design problem, but it may be that Amstrad is finding to make the machine load both old and new software.

The company will however be spending £2.4 million on advertising the machine this Christmas, and Barry Young, managing director of Amstrad Distribution, is predicting that it will take 40 per cent of the games machine market over the next few months.

The new Amstrad PC is however ruffling feathers among some dealers. Amstrad will only sell the machines through what it describes as "approved Amstrad dealers," and Amstrad Distribution has sent out a letter detailing the requirements for this.

"Unless you are able to meet the criteria as specified, then please do not waste our time or yours," it reads winningly.

The major requirements are that shops selling the PCs should have a "Business Computer Centre," with two staff trained in the Amstrad range and facilities for individual hands-on demonstrations. The Centre should also be separated from home computers and games software. These conditions are liable to cause severe space and staffing problems for small dealers, but will also mean that many major multiples will need to reorganise their stores.

From Amstrad's point of view it could however be useful to have smaller dealers ducking out of the PC range and continuing to stock the PCW, as this will avoid the two machines getting into too close competition with each other.

Low-cost hardcard planned for PC

AMSTRAD is now predicting that first shipments of its PC will arrive at the end of this week. It is, however, unlikely that hard disc versions of the machine will be available for some time yet, and third parties are already gearing up to plug the gap.

Foremost among these is distributor Northamber, which has been taken on by Amstrad to supply the PC and which hopes to secure a supply of hardcards this week.

A hardcard is basically a small Winchester hard disc mounted vertically on a card which is plugged into a PC's expansion slot, and has the advantages of being easy to fit and allowing both floppy drives to continue to be used. Amstrad's hard disc on the other hand fits into the position normally used by one of the floppies.

Northamber is reluctant to talk about the cards, but it's believed they'll be available in both 10Mb and 20Mb versions. According to spokesman, Eddie Moore, the cost will be comparable to Amstrad-supplied hard disc machines and less than an Amstrad upgrade.

Like the Amstrad hard disc units they will take up one of the machine's three available expansion slots, but because of the width of the card they'll also limit one other slot to a half length card. Because the Amstrad already has most of the Ram and I/O you'll need on board, this, however, is unlikely to be a problem.

A hard act to follow . . .

Correction

Those of you who have been following the *Popular* vs *Colossus* chess game, and are wondering how on earth the bishop managed to move from f1 to c6 in game one, need wonder no longer.

The move should have read **3**B f1–c4. The collators will take this into account when deciding the next readers' move.

PCW now stores more

YET another company is to supply a hard disc unit for the Amstrad PCW. The latest upgrade is from ASD Peripherals, and costs £574 for a 10Mb drive and £689 for the 20Mb. The units are external, and include an extension to the PCW's expansion bus so that all existing add-ons can be used at the same time.

The complete setup consists of a controller module which plugs into the expansion socket of the PCW and a combined drive unit and power supply that sits under the PCW itself.

Details from ASD Peripherals, 03224 49235/6.

Amstrad PC user group

A user group for the Amstrad PC has been formed already. The 1512 Independent User Group intends to publish a regular newsletter, run a helpline, offer software discount, hold meetings and run a public domain software library. Membership is £20 a year. Further information is available from Paul Mullen on 0732 450908.

Sidecar to launch soon?

COMMODORE is thought to be preparing to launch Sidecar, its PC emulator for the Amiga, in the UK shortly. Price isn't yet certain, but according to a source within the company it's to be pitched low to match the price of the Amiga 3, the new entry-level Amiga Commodore intends to announce at the US Comdex show in November.

Commodore UK general manager Chris Kaday is still adamant that there will be no new Amigas in the UK, either announced or in the shops, before Christmas, and although a spokesman confirmed that there would be an announcement from the company this week he categorically denied that it would be Amiga-related.

Kaday however doesn't rule out the possibility of new products being shown elsewhere in the world. Commodore US is currently thought to be working on both the Amiga and the 64 range, with the Ranger, a 68020 machine coming in above the current Amiga and a lower cost development, the Amiga 3, coming in under it.

The 64 range is also thought to be undergoing revision. The recently launched 64c is being viewed by industry sources as a stop-gap machine that will be the subject of development, reducing the chip set to make it cheaper to produce and easier to upgrade. This of course clashes with the 128, which was originally intended as the upgrade path for the 64, but which is expensive to build and has largely failed to displace the older machine.

Commodore UK denies that it is withdrawing the machine, but of the two models only the 128D, which is too expensive for a mass-market machine, is now readily available in the UK. The company therefore needs to be able to price its 8-bit machines lower if it is to remain in the home market.

Acorn shows up in Manchester

THIS weekend's Electron and BBC Micro User Show will feature Acorn itself, showing its new Master Compact machine. Among the launches expected are a £700 Winchester system, £79 Master console unit and a £16.95 Rom cartridge adaptor from Viglen, while Care Electronics will be showing cheap Master cartridges and an extender to allow old Rom cartridges to work on the new machines.

Among the other companies present will be Norwich Computers, showing a utility Rom for Wordwise Plus, and Advanced Computer products with a new disc interface for the Electron.

First launches £50 PC integrated package

PRICES for integrated software packages for the PC are set to tumble shortly, with the launch of Decision Director, a £49.95 combination spreadsheet and word processor from First Software. As the package will be priced lower than most PC word processors it should provide stiff competition for the reduced price Framework (see separate story) despite the fact that it doesn't include a database.

First will also be importing a new database, Able, to be priced at £86. This again will be under the predicted price for the PC1512 version of dBase II.

Details from First Software, Unit 20D, Horseshoe Road, Horseshoe Park, Pangbourne, Berks RG8 7SW (07357 5244).

Software Hotlines

Not wishing to repeat the fiasco of their last major licensing deal (*Superman*), **Beyond** is pulling all the stops out for *Star Trek* – as the development versions so far indicate (see below). It's big (1000 stars), complex (255 subplots), and looks lovely on the telly (lots of digitised pictures of crew members, etc).

The plot has the Enterprise investigating the mysterious defection of Federation starships within an area of space called 'The Quarantine Zone', centred around the planet Adakiak. Tricky stuff. If they don't run out of memory, it could well be the game of the year . . . although exactly which year is still uncertain.

It's official – multi-player stand alone arcade games are in, the whole thing started off around a year or so ago in this country with that one to four player fantasy adventure from **Atari**, *Gauntlet*, soon to be emulated in some fashion by **US Gold** (*Gauntlet II* – a two player adaptation – should be hitting the arcades soon). Then came **Sega's** attempt at the multi-player market, *Quartet*. Although placed in a space-age setting, this shoot-'em-up was never as graphically impressive as *Gauntlet*.

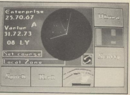
Kirk quarantined

This was followed by *Super Sprint*. Again from **Atari**, this is 1–3 player racing game, derived from their mid-seventies game *Sprint*. Possibly the best game in the arcades at the moment, **Electric Dreams** is in negotiations presently for the home computer rights. But who is going to be the first to go for *Rampage* – the latest multi-player from **Bally-Midway**? This is a 1–3 player game in which you each play a gigantic gorilla taking apart an American city – complete with National Guard sharpshooters and innocent civilians to stomp. Straight out of King Kong, expect one of the big boys to snap this one up pronto.

Here's a heartening tale for any lone programmer. Dominic Robinson started on a BSc Computing course at Bristol University – but decided that they weren't teaching him the kind of things he wanted to know. After leaving he messed around a bit on his Spectrum, came up with a few ideas on how to implement *Uridium* on it . . . then went to visit Hewson.

Hewson, by coincidence, had already been thinking along the same lines – so the company took him on, and the rest is history. Everyone that saw the demo at the PCW show couldn't fail to be impressed – it'll be out on 28 October.

John Cook



Enterprise zone

Apple launches new 16-bit IIGS

APPLE'S follow-up to the Apple II, the IIGS, is to go on sale towards the end of the year at an entry-level price of £995. The machine is compatible with the II series – which it will replace – but uses the 65C816 processor, which is the 16-bit version of the 6502 used in the Apple II.

The Basic system consists of 256K Ram, monochrome monitor, mouse and external 3½ inch 800K drive unit. The main system unit has composite and RGB outputs, headphone jack, bus input port, disc interface for both 5¼ inch and 3½ inch drives, twin serial ports, communications chip and joystick port. It also has eight expansion slots, and sports a synthesiser chip. Ram can be expanded to 8Mb and the 128K Rom to 1MB, and resolution is 640 × 200, with seven display modes.

The new Apple

Apple confirms that the IIe and IIc are now dead, and in this country proposes to target the new machine at small businesses and at the II's existing user base. An upgrade for existing users will be available in the US, but Apple UK is unlikely to bring it into this country.

Horse feathers KBS' nest

KBS Interactive Software considers that its latest idea is a runner. The company claims to have been working on the use of expert and rule-based micro systems for use in everyday applications and, says Cliff Walden-Goodwin, "We decided to apply rule-based theory to what must be every punter's dream – making a profit at the races."

KBS claims a success rate of 80 per cent plus, and is to launch the system on the open market at the beginning of next year. Punters eager to press money into KBS' hands before then should, however, bear in mind that similar computerised systems were being blamed for last week's spectacular crash on the New York Stock Exchange . . .

In a separate initiative KBS is also opening a 'software factory' near its Tyne & Wear base. The idea of the factory is to offer young programmers working space and office facilities for £12.50 a week, and to try to encourage a cross-flow of business between the programmers and KBS. Interested parties should phone 0207 543053.

TAXAN
NLQ PRINTER BUFFER

M&M Technix's new buffer

NLQ extras for Epsons

THE M&M Technix NLQ Printer Buffer is a buffer and NLQ upgrade for dot matrix printers. The buffer size can be either 8K or 32K, while the NLQ feature, which requires an Epson-compatible printer with quad-density graphics, allows print in four character sizes and a variety of fonts. Three of these are supplied with the buffer, and further versions can be obtained from M&M. The units cost £128 for 8K and £164 for 32K.

Details from M&M Technix, Abindon Business Centre, 346–376 Osmaston Road, Derby DE2 8AG.

Cheap dBase out soon for the PC

A £120 version of *dBase II* should be available for the Amstrad PC later this year. The program is already available in CP/M format for the Amstrad PCW, but like other major software producers publisher Ashton-Tate had until recently set itself against price cuts on its PC software range.

But now, in a spectacular volte face, A-T has bowed to the inevitable and has invited tenders from third party distributors to handle support and marketing for both *dBase II* and a low-cost version of the *Framework* integrated package. The latter will be cut down to avoid damaging the company's existing market for the full version, but *dBase II*, which has to an extent been superseded by *dBase III*, will be practically a full version.

Mailmerge for Locoscript

QMAIL is a mailmerge utility designed to work with Locoscript. It supports right justification, tabs and centred text and allows you to select particular people from your list before doing a mailshot. It costs £29.95.

Details from Proteus Computing, 2 Iffley Road, London W6 (01-748 2302).

Real-time clock for the 64

ELECTRONIC and Computer Workshop has produced a battery backed CMOS Ram and real-time clock plug-in module for the Commodore 64. The module's timing facilities aren't affected by the 64's internal timings, which are often interrupted, and it includes 50 bytes of CMOS Ram which can be used to store information such as set-up data even when the machine is switched off. The module costs £36.11 in kit form, or £50.45 ready built.

Details from Electronic and Computer Workshop, 171 Broomfield Road, Chelmsford, Essex CM1 1RY (0245 262149).

Product News

New printers from Citizen

CITIZEN has launched three new printers – two in its MSP series and one new high quality model, the HQP 45.

The MSP 10E and 15E are functionally indentical, but the 10E is 80 column while the 15E is 136. Draft output speed is 160 cps and near letter quality 40 cps. The machines have 8K buffer, full bit-image graphics, proportional spacing and Epson and IBM compatibility built in. They cost £349 and £449 respectively.

The HQP 45 prints at 1200 cps in draft, 132 cps in correspondence and 66 cps in letter quality. It has 136 column width, Centronics and RS232 interfaces as standard, and optional IBM and Espon emulation. The HQP 45, which costs £935, has a 24K buffer and can take additional plug-in fonts.

Viewdata for free

THE Middlesex Training Centre has set up a free viewdata service whose subject matter ranges from local Hillingdon information, through computer news, to information about the centre itself. The service includes a wide range of machine specific databases and a mailbox facility, and runs 24 hours a day, 365 days a year.

Details from Hillingdon Itec, Norland House, Wallingford Road, The Trading Estate, Uxbridge, Middlesex. Tel: 0895 56849, Prestel mailbox 0895 31726 or 0895 59842 for viewdata access.

CD survey published

CD-ROM Standards: The Book is the latest phase in the micro industry's plans to develop a standard volume and file structure for CD-Rom drives. The book puts forward the standard proposal developed by the High Sierra (no relation to the film of the same name) Group, leading participants in which include DEC, Apple and Microsoft. It is described by the publishers, Learned Information and Infotech, as the "definitive guide to CD-Rom standards," and is being sold for £50.

Details from Learned Information, Woodside, Hinksey Hill, Oxford OX1 5AU. Tel: 0865 730275.

Smart switches for Data

CRAFT Data is now importing a range of switch devices, designed by US company Via West, to allow micros to share peripherals. The switches cover IBM, Centronics, RS232 and other common interfaces, and switching between devices can be either manual or through software. They need no external power supply, and start at £30.

Details from Craft Data, 92 Broad Street, Chesham, Bucks HP5 3ED. Tel: 0494 778235.

User group with Flare

FLARE Technology's Ram Music Machine has acquired an official user group just weeks after its launch. Price and benefits of membership had yet to be fixed as *Popular* went to press, but further information is available from organiser Al Straker, 19 Sandringham Road, London NW2 5TP.

Taspro goes onto Amstrad

TASPRO, Seven Stars' *Tasword* utility which allows proportional spacing in justified *Tasword* copy, has now been converted to run with *Tasword 464* or *464-D*. The program includes pause control for daisywheels, allowing printwheels to be changed during printing, and handling of alternate mode characters in Epson FX80 proportional mode. It can also justify redefined characters, and supports a wide range of printers. Price is £7.95.

Details from Seven Stars Publishing, 34 Squirrel Rise, Marlow, Bucks SL7 3PN. Tel: 06284 3445.

ST gains Transputer

KUMA is selling its K-Max parallel Risc processing system for the ST for a cool £1,706. The system consists of a dual processor board containing two Inmos Transputers and two blocks of Ram of 256K each. The system has a potential speed of 15 Mips (million instructions per second).

Technical freaks can get details from Kuma, 12 Horseshoe Park, Pangbourne, Berks RG8 7JW. Tel: 075357 4335.

Correction

In *Popular*, September 11, we inadvertently gave the incorrect number for Memotech Computers, in a reply to a letter.

The correct number is 0993 78691, and Memotech's new address is Unit 24, Station Lane Industrial Estate, Witney, Oxon.

Diary Dates

SEPTEMBER

26–28 September

Electron and BBC Micro User Show

UMIST, Manchester

Details: Software, hardware and peripherals for BBC machines.

Price: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

OCTOBER

3–5 October

The Amstrad Computer Show

Novotel, London

Details: Home and business software and hardware for the Amstrad range.

Price: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

4 October

2nd Welsh Dragon Computer Show

Cardiff–Wales Airport

Details: Software and hardware for the Dragon.

Price: £1 adults, children and OAPs 50p.

Organiser: John Penn, 04203 5970.

30–31 October

Hampshire Computer Fair

Guildhall, Southampton

Details: Business computers.

Price: Free entry by business registration.

Organiser: Testwood Exhibitions, 0703 31557.

NOVEMBER

7–9 November

Electron and BBC Micro User Show

New Horticultural Hall, Greycoat Street, London SW1

Details: Hardware, software and peripherals for the Electron, BBC micro and Master series.

Prices: £3 adults, £2 children, £1 discount for advance booking.

Organiser: Database Exhibitions, 061-456 8835.

8 November

UKEUG National Einstein Show

National Motor Cycle Museum, Birmingham

Details: Einstein software and hardware.

Price: Free.

Organiser: UKEUG, 07982 2399.

Prices, dates and venues of shows can vary, and you are therefore strongly advised to check with the show organiser before attending. *Popular Computing Weekly* cannot accept responsibility for any alterations to show arrangements made by the organiser.

Letters

To dump on K-Graph

We appreciated your publication of a review of our business graphics package *K-Graph* for the Atari ST series in last week's edition of *Popular Computing Weekly*.

Unfortunately the reviewer seems to have been unable to print a screen dump and claims it cannot be done, this is incorrect. Up to four windows can be displayed on the screen simultaneously, this would be pointless if the display could not be printed. To obtain a screen dump all the user has to do is pick up the 'Picture Icon' and drop it on the 'Printer Icon', exactly as described on page 55 of the *K-Graph* manual.

An example of the results obtainable by the above method can be seen in our enclosed software leaflet.

All the printing is done by using icons and drop down menus, we were surprised that this is 'too fiddly' for Mr. Evans, there are certainly several options built in, though none of these could be described as difficult.

Jon Day
Sales Manager
Kuma Software

Xen X2

Looking at the two articles on Xen-Basic (*Popular*, September 4/11), may I make two points?

Firstly, the command |*Proglen* can be used on CPC 664s and 6128s by changing two numbers in Line 200 – the number 131 in the fourth row of Line 200 becomes 102, and 129 on the fifth row becomes 100. These are the low bytes of the addresses where the end and start of Basic are stored.

Secondly, the description of |*Rompeek* has a mistake – Rom should be 0 to examine the lower Rom.

On a general note, I think it would be better to print the data for machine code programs in hex rather than decimal: 205,90,187 is totally incomprehensible, but CD,5A,BB is instantly recognisable (to Amstrad buffs at least) as the call to print a character.

Ewen Flint Dumfries

continued on page 10 ▶

Star Letter

Can't Fool an Amsdos

Your reply in Peek and Poke, September 4 concerning loading *.Com* files under AMSDOS unfortunately doesn't work. No amount of renaming will fool AMSDOS because it creates headers for each file containing all the information about file name, type, length, etc.

I have had this problem myself as I wanted to use *Devpac* to disassemble *.Com* files.

The solution is first to create a dummy file under AMSDOS with

```
SAVE "TEST.BIN",b,&2000,length
```

where length is the size of the *.Com* file you wish to transfer. Next boot CP/M and use *DDT* to load the dummy file with

```
DDT TEST.BIN
```

Examine the header with *d100* now if you wish. An interesting point is that if you have renamed the file the header still contains the original name.

Next overlay your *.Com* file using *DDT* with

```
ITEST.COM and R80
```

80h being the offset required so as not to overwrite the header. Exit *DDT* with *g0* and save the final version of *Test* with

```
SAVE length in pages TEST.BIN
```

The length in pages is the original *.Com* file length plus *80h*, the header length, all divided by 256. AMSDOS will now recognise your CP/M *.Com* file. It sounds a bit involved, but works fine. If anyone knows a better way I would like to know.

Alex Aird
Birmingham

Puzzle

Puzzle No 226

There are three boxes on a shelf just about in reach. You cannot look inside, but you can remove the coloured balls contained therein.

On each box is a label, but unfortunately the labels have got mixed up and are on the wrong boxes. Inside each box are two balls in the correct combination, ie, red/red, white/white, red/white.

The object is to determine the minimum number of balls to remove from the boxes in order to discover which balls are in which box.

Solution to Puzzle No 221

Answer

The final arrangement of coins is . . .

```
H T H T H T H T
H H T H T H T T
H H H T H T T T
H H H H T T T T
H H H H T T T T
H H H T H T T T
H H T H T H T T
H T H T H T H T
```

Solution

The solution utilises a two dimensional array N (N,N) to represent the chess board. Each value in the array is originally set to 1. This represents a coin with heads uppermost. Using conventional X and Y axis each square is taken in the order described in the puzzle.

Lines 70 to 340 'turn' all coins in line either horizontally, vertically or diagonally. This is exactly the same as the squares attacked by the queen in chess. The coins are 'turned' by multiplying the value in that unit of the array by minus 1, thus +1 becomes −1, and −1 becomes +1. Line 60 'turns' the coin on which the queen stands only if it is heads uppermost.

Finally lines 1000 to 1030 print out the final array, plus 1 indicating 'heads', minus 1 indicating 'tails'.

Winner of Puzzle No 221

The winner this week is M J Fecher of Maidenhead, Berks, who will be receiving £10.

Rules

The closing date for Puzzle No 266 is October 13.

```
 10 N=8
 20 DIM N(N,N)
 30 FOR X=1 TO N:FOR Y=1 TO N
 40 N(X,Y)=1:NEXT:NEXT
 50 FOR Y=1 TO N:FOR X=1 TO N
 60 IF N(X,Y)=1 THEN N(X,Y)=N(X,Y)*-1
 70 X1=X:Y1=Y
 80 X1=X1-1
 90 IF X1<>0 THEN N(X1,Y1)=N(X1,Y1)*-1:GOTO 80
100 X1=X:Y1=Y
110 X1=X1+1
120 IF X1<>N+1 THEN N(X1,Y1)=N(X1,Y1)*-1:GOTO 110
130 X1=X:Y1=Y
140 Y1=Y1-1
150 IF Y1<>0 THEN N(X1,Y1)=N(X1,Y1)*-1:GOTO 140
160 X1=X:Y1=Y
170 Y1=Y1+1
180 IF Y1<>N+1 THEN N(X1,Y1)=N(X1,Y1)*-1:GOTO 170
190 X1=X:Y1=Y
200 X1=X1+1:Y1=Y1+1
210 IF X1=N+1 OR Y1=N+1 THEN 230
220 N(X1,Y1)=N(X1,Y1)*-1:GOTO 200
230 X1=X:Y1=Y
240 X1=X1+1:Y1=Y1-1
250 IF X1=N+1 OR Y1=0 THEN 270
260 N(X1,Y1)=N(X1,Y1)*-1:GOTO 240
270 X1=X:Y1=Y
280 X1=X1-1:Y1=Y1+1
290 IF X1=0 OR Y1=N+1 THEN 310
300 N(X1,Y1)=N(X1,Y1)*-1:GOTO 280
310 X1=X:Y1=Y
320 X1=X1-1:Y1=Y1-1
330 IF X1=0 OR Y1=0 THEN 350
340 N(X1,Y1)=N(X1,Y1)*-1:GOTO 320
350 NEXT X
360 NEXT Y
1000 CLS:FOR Y=1 TO N:FOR X=1 TO N
1010 IF N(X,Y)=1 THEN PRINT;"H";
1020 IF N(X,Y)=-1 THEN PRINT;"T";
1030 NEXT X:PRINT:NEXT Y
```

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Letters

Eiderdown price list

I am writing concerning a serious misprint in the *PCW* show report in *Popular Computing Weekly*, September 11. The misprint concerns our software titles for the Atari ST, *ST Karate, Space Station, ST Protector, Fireblaster* and *War Zone*.

The programs were criticised as being a little on the expensive side. I agree. The reporter gave incorrect prices! *Space Station* and *Karate* are £24.95 (not £29.95), while the others are only £19.95 each (not £24.95).

Reference is also made to an unknown game with rather colourful graphics, but small sprites. This game, *Haunted House*, is part of our super demo disc, which includes this game, a slide show and some desktops.

What's more, it's absolutely free of charge (save the cost of the disc) and can be obtained either by sending a disc to us with an S.A.E., or from most Atari dealers. Readers may like to know that the games can be recognised in the shops by their distinctive triangular packaging.

Eidersoft Software

Beginners be warned!

A warning to beginners like myself! It was not until I saw my letter in (*Popular*, 28 August) headed *DirEdit debugged* that I realised that my recently bought printer CP 80 Type 1, prints out lowercase *g* very similar to lowercase *q*. Thus it was no fault of your typesetters that my reference to line 140 was printed to include *qa$(16),qb$(16)*. In other words (and trying to type with my fingers crossed), this portion should have read *ga$(16),gb$(16)*.

By way of atonement, here is a little tip for program listers: when you finish typing a stage, use line one *Remmed* to record your last line number. When you recommence, load and *List 1* to find your starting place. If you update the number at the end of each period it will keep the lead in your pencil!

Joseph G Berry
Northants

A new command

With regard to Simon Goodwin's RSX program – 32 new commands for the Amstrad CPCs, *Popular*, September 4 – he deserves top marks.

However, I found a small mistake with one of the commands. The command *RScreen* should be *RScroll* – this is given in the *Help* command.

Also here's a little addition to save space and loading time:

Replace line 50 in the main program with

```
50 SAVE "XEN.BIN",b,41000,1445
```

Then, to load, just

```
MEMORY 40999
LOAD "XEN.BIN",41000:CALL
41000
```

Kim Foskett
Market Harborough

Questions . . .

With reference to the article on pages 12 to 13 of *Popular Computing Weekly* 11–17 September 1986 that explained how to expand the Amstrad DMP-2000's buffer to 8K. The article mentioned that a suitable 8K Ram chip could be obtained from RS (ref 301–870), but did not give an address for this company. I would be grateful if you would publish the address.

One further point, on my printer the three pads marked J3 have a link wire going from the middle pad to the right hand pad on the top of the circuit board (looking at the board in the same orientation as in figure 2 in the article) and not as stated in the article a PCB track on the underside. Hence it is necessary to cut or remove this link wire and then to connect the left hand pad to the middle pad. This may be of help to those readers with particular interest in this article who may be experiencing some confusion over this point.

A Fisher
Prestwick, Ayrshire

The Ram chip in question (see letter below) is the 6264. RS (Radio Spares) can be contacted at Lammas Road, Weldon Industrial Estate, Corby, Northants NN17 9RS (0536 201201).

And answers . . .

Having read with interest the article on the expansion of the Amstrad DMP2000 printer buffer. *Popular* September 11, I have the following comments to make. I have been doing this modification to the printer for some time now and I am afraid that Mr Race has a lot of his facts wrong. The most important thing that I think readers should know is that just by taking the case off the printer and removing the chip, will invalidate the Amstrad warranty. However, this is not the most important part of the problem.

Point number one. The 8K Ram chip to use is not a 6164 but a 6264 and it is a 28 pin chip, which can be purchased from any good electronics store for less than £3.

Point number two. There is no need for the PCB to be removed from the casing as the link J3 should have a removable top, which when taken off can be changed to the other side, ie, like in the drawing but without the need of any tools except a small pair of pliers.

I hope that this will clear up a few of the problems that might occur when people without too much electrical knowledge try to use a soldering iron. I might add that this modification to the DMP2000 is a very simple job for anyone to tackle. It seems to me that it was the intention of Amstrad to put an 8K Buffer in, but changed their minds at the last minute.

I hope that this has cleared up one or two points on this matter.

J B Palmer
Warblington
Havant

Dave Race replies: Indeed the 6264 CMOS 8K by 8-bit Ram chip is the one you want. My own DMP printer's J3 link does not have a removable top, but I can well believe that some models do.

To put it in black and white

May I clarify the situation regarding the "monochrome" option for the Amstrad PC1512. In common with the CPC464, the PC1512 is fundamentally a *colour* computer, the "monochrome" monitor converting each individual colour to a different shade of grey.

Thus the assertion by John Lettice in *Popular*, September 18, that PC games will not run on a monochrome Amstrad PC is incorrect. I suspect he is confusing our "monochrome" implementation with the IBM/Hercules monochrome standard (which you can of course fit, with a suitable monitor, in one of our expansion slots).

As suggested in his review on page 15, games software houses are converting their games to use the Amstrad 16 colour standard and mouse. At the *PCW* show we have already demonstrated *Cyrus Chess* and *Alex Higgins Snooker*, both of which use the Amstrad 16 colour mode and mouse (and are available from Amsoft).

R Perry
Technical Manager
Amstrad Consumer Electronics

John Lettice replies: Mr Perry is quite correct, and my apparent assertion that "if you have a monochrome monitor none of the games will run" is actually a load of old codswallop. The text as published didn't, however, reflect what I originally wrote. My point initially was that you can't buy a bottom of the range, non-Amstrad PC compatible with mono monitor and expect games software to run, because they don't in general have a graphics adaptor. The Amstrad, as Mr Perry so lucidly points out, doesn't have this problem.

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Atari versus Amstrad

John Lettice talks to Atari president Sam Tramiel about the newest Atari computers

If the recent *PCW* show proved anything it was that the micro market is diverging into two main strands.

Amstrad launched its PC in the week of the show, and the machine, although an excellent implementation of the IBM standard, is in no means new. Like Amstrad's other micros it is essentially a well-executed package of tried and tested products, and technically breaks no new ground.

The other strand is currently represented by Atari, which although clearly out-ballyhooed by Amstrad at the show, was extolling the virtues of high tech and deploring the vices of packaging to everyone who'd listen.

There's generally at least one Tramiel holding court to the press at each major show, and this time, although Jack was absent, sons Sam and Leonard were filling the slot admirably. In the company's home US market Amstrad hasn't made an impact, and won't do until it launches its PC there next spring, so it's curious that Atari president Sam Tramiel already talks of the British company as a major competitor.

The US is currently pretty well overrun with cheap PC clones, and although 68000-based machines like the ST, Macintosh and Amiga have managed to carve out a niche for themselves, they've in no sense achieved mass market status.

ATARI
800XL
130XE
MACHEN SPITZEN

Considering the conditions it would seem logical for companies like Atari to batten down the hatches and wait for the PC storm to blow over.

Sam Tramiel, however, doesn't accept this, seeing the PC standard as something Atari should be in head-on competition with. Asked how he'll do this he waves his hand airily towards the corner of the room. "With that," he says.

The 'that' in question was, at the time of the *PCW* show, a mock-up of a new PC-style package of system unit, detached keyboard and monitor based on the ST. According to Tramiel the machine is already in prototype form, and will be launched directly against Amstrad and the clones.

> *"The Atari ST will be available in a new housing, so you'll either get it as a complete package or à la carte"*
>
> **– Sam Tramiel on the new Atari machines**

"It'll mean the ST will be also available in a new housing, so you'll get it either as a complete package, or *à la carte*." The mock-up bore the legend "2080ST", but Atari isn't saying what it will eventually be called.

Tramiel claimed to be unsure whether the base machine will have 2Mb or 4Mb of Ram as standard, but it seems likely that first models will be 68000-based, with 68020 versions to follow.

Pressed on price, Tramiel first says it will be priced "competitively", then elaborates.

"There's no reason for it to be priced under Amstrad, it will be either the same price or slightly over," the argument being that the ST is vastly superior to the PC technically, and can therefore sustain some price disadvantage.

But if it's to compete with Amstrad on price Atari has a problem. Amstrad now has an entry level, single drive machine with bundled mono monitor for £459, and even if Atari were to produce a bundled version of the 520ST to compete here – which clearly wasn't what Tramiel was talking about – it would have to drop the machine's price by around £100, with similar implications for the rest of the range.

Launch date is also equivocal, as Tramiel would clearly like to get the new version STs out this November, while general manager Max Bambridge guarantees "no more new machines before Hanover" (next year's Hanover Fair), then undercuts himself by saying that because the micro market changes so fast, that statement only holds good for two weeks.

Bambridge also categorically denies that Atari will be launching a £459 Amstrad-basher, and changes the subject when it's suggested Atari might currently be split over whether to go for Amstrad or not.

As far as Sam Tramiel is concerned, it's more a case of 'how' than 'whether'.

Clearly he wants the ST to supplant the PC as a world standard, and clearly he wants to begin to make this happen, but he's still looking at market conditions – British market conditions in particular. The question – which he's not too proud to ask people – is whether the ST can compete on a combination of power and price, or whether it can only face Amstrad by competing on price.

If the answer is price, then the next question Atari must ask itself is whether it can afford it. If it decides it can we might just see some interesting new launches a lot earlier than Hanover.

Have you entered our Autumn Competition?

We've reached the halfway point in our autumn bonanza now, and here are two more science fiction movie stills for you to identify.

Remember — don't send anything in yet. There are two more films to be identified next week, and after that, we'll print the entry form, and maybe drop a hint or two.

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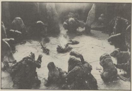
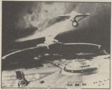


Picture 5 (above): Which film featured these weirdos?



Picture 6 (left): Not so difficult perhaps, but which movie in the series does this still come from?

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The basic alternative for the ST

A new Basic is something that the ST is in need of. On paper there's nothing actually wrong with *ST Basic*, but a combination of bugs, the random destruction of the contents of string variables probably being the worst, and the awful editor makes programming a nigh on impossible chore.

So, if you can't be bothered waiting for Atari to replace it sometime in the distant future and you want to do some programming then an alternative is worth considering.

Fast ST Basic is one such alternative, from Computer Concepts, well known for their BBC software. Indeed, there is a certain BBC Basic flavour to some of the commands available. Not only that, but a number of word processing features have been included as well.

If your're going to call a product *Fast ST Basic* then to retain credibility it should knock along at decent pace. In fact it does more than that, it positively flies. Below are the results when the Basic undertook the PCW benchtests, beating everything in sight from all eight bit machines (including the Amstrad PC alone) to 68000 based computers like the QL and Macintosh.

Benchtest No.	Speed (seconds)
1	0.145
2	0.58
3	1.305
4	1.455
5	1.51
6	2.58
7	4.105
8	2.73

Average: 1.801 seconds

The first thing to note about *Fast ST Basic* is that unlike the official language, it is supplied on a 128k cartridge which takes up no user memory. After a couple of clicks on the relevant icons, the two main windows of Fast Basic appear almost instantaneously.

These are the edit and output windows. All program output is shown in the output window, naturally, but using some of the available commands it's quite easy to print outside it; anywhere on the screen in fact.

The edit window allows the inputing of program lines as well as correcting and editing facilities. Amongst the editing options are the facilities to cut, copy, paste and clear chunks of a program listing. The word processing theme continues with a search and replace feature and the fact that you can have ten different programs in memory (in segments which are allocated 32k when something is put into them) at the same time, although they won't run concurrently.

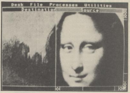
The other window available is the immediate window which is basically used for testing what a particular command will do without having to run a program.

Students of structured programming will be well pleased, because as well as offering *Def Proc . . . Endproc, Repeat . . . Until, If . . . Then . . . Else, Endif,* and *While . . . Wend* constructs, line numbers are completely optional in the program. If used, line numbers are simply utilised as labels and so are not automatically sorted as in other Basics. A program numbered 20, 30, 10, 5 will run in exactly that order, not the usual numerical order.

The ST is renowned for its quality graphics so it's nice to see 64 graphics related commands. It's possible to set the various patterns and colours used by the commands that draw lines, circles, pie charts, arcs, elliptical versions of the preceding commands, boxes, polygons, rectangles with rounded edges, fills and plot points.

A useful feature is the ability to print text, in various styles, at any graphics location on the screen, providing that the location is inside the user defined graphics area (which can be outside the output window!). Once there, text can be scrolled in any direction for any distance, one pixel at a time, and believe me, it does it very quickly, with just one command. Text can also be justified on a pixel rather than character square basis.

Most impressive of all is the *Blit* command, a software blitter. Once an area of the screen has been defined, it can be moved around at will, although with nine parameters required it's certainly no doddle.



A famous smile for fast ST Basic

With the *Palette* command available, any of the ST's 512 possible colours can be displayed, something else that ST Basic could not manage to do.

An interesting pseudo variable is *Physbase* which can be read or written and determines which part of memory is used as the screen display. So, various picture screens could be loaded in and then displayed instantly by changing the value of *Physbase* to point to them. *Logbase* is a related pseudo variable which points to where in memory all screen output will end up. So, it's quite feasible to set an entirely new display area, free from the constraints of the output window, the size of which cannot be defined from within a program anyway.

File handling, serial and random access, is covered fairly comprehensively, the commands allowing the creation of directories and files and the reading and writing of characters, or blocks of characters, within them.

Perhaps the most staggering advantage of *Fast ST Basic* over the official lingo concerns using the various facilities offered by GEM. Atari *ST Basic* has such no commands, whereas *Fast ST Basic* is incredibly comprehensive, providing the means to do virtually anything. Mouse control, drop-down menus, dialogue and alert boxes, windows and the like are all available. However, it has to be said that for the more advanced commands a thorough knowledge of the subject is required before attempting to use them.

And finally, there is an assembler built-in which enables Basic and assembly language commands to be used together, in BBC micro style. Unfortunately there are only a scant 11 pages of the manual devoted to the assembler which can hardly be said to be enough.

Fast ST Basic is not perfect, program lines can be larger than the edit window causing the left hand side of the line to vanish as window scrolls everything along (it means you can't see all of the program line at once). There's no command to change screen mode and the sound commands are few (three) and somewhat crude.

One other problem – the manual is inadequate in places; there again how could it hope to cover everything in detail without being so large as to add pounds to the selling price of the whole package?

But any way you look at the thing, it's a vast improvement on Atari ST Basic in virtually all departments, very fast and definitely worth considering.

Duncan Evans

Program *Fast ST Basic* **Micro** Atari ST **Price** £89.95 **Supplier** Computer Concepts, Gaddesden Place, Hemel Hempstead, Hertfordshire HP2 6EX.

Exploring the cave of the Word Wizard

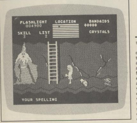
Educational software has very seldom been 100% satisfactory. Either it is very good educationally but poorly programmed, lacking motivation and ease of use, or very well programmed but totally useless as far as teaching is concerned.

A new product from Timeworks UK, the distributors of various business software, for the C128 brings a fresh approach to educational software, with *Cave of the Word Wizard*, a spelling game with a built-in speech facility.

The program comes on a disc where Side a contains the main program, and Side b contains additional word libraries. The game is similar in play to *Impossible Mission:* you are in the Wizard's Cave, and you must find four crystals to escape.

There are eight levels in the cave (which are reached via ladders and holes), and of course there are nasties, namely rocks, spiders, puddles which will require a plaster when bumped into.

> *"The whole thing is very well presented, and is a lot of fun to play even for a grown-up, with several libraries of words to take care of the advanced player"*



From the *Cave of the Word Wizard*

As you proceed with your quest, the batteries of your torch weaken, and the wizard appears at regular intervals to ask the spelling of a word. It is fair to say that the speech is excellent, the only snag being a hint of American accent. If you spell the spoken word correctly, you are rewarded with extra batteries or plasters, otherwise you lose some light. You lose if you run out of light or have encountered too many nasties.

The whole thing is very well presented, and is a lot of fun to play even for a grown-up, with several libraries of words that should take care of the more advanced player. A nice touch is the facility to choose between being a little boy or a little girl.

The acid test came when young children played the game. The results speak for themselves: children will play it for hours. I would definitely class this game as one of the best educational programs ever published.

Eric Deghaye

Program *Cave of the Word Wizard* **Micro** Commodore 64/128 **Price** £19.95 (disc only) **Supplier** Timeworks UK, PO Box 453, Maidenhead, Berks SL6 1ST.

The Rolls-Royce of merger programs

No matter how good the hardware, or the operating system, or the programming language, no manufacturer has yet released the perfect programming system.

Which is good news for hackers who like to write their own utilities. And better news for software companies who like to sell utilities to those of us not up to writing our own.

Companies like Indev, which has recently released *Blinker* for the Commodore 64.

Blinker is a Basic linker, somewhat like the merge utilities often included in programmer's toolkits, or printed in magazines like *Popular*.

However, *Blinker* is to merge utilities what a Rolls-Royce is to a Citroen 2CV.

What *Blinker* does is to allow you to create libraries of oft-used routines, and incorporate them into new programs with consummate ease. More to the point, it's a rock-solid piece of software which tells you what's happening as it happens, what's just happened, whether anything went wrong, and what the state of play is after it's done all these things.

Error messages are clear and helpful, and the documentation is excellent with full examples, memory maps and so on.

Suppose you want to write a simple database (or even a complicated one). Break it down into a number of routines; add a record, find a record, delete a record, sort a file, load a file, save a file, etc.

Now, clever chap that you are, you already have a sort routine, and save, load and print routines, and all sorts of other useful stuff.

Instead of writing it all over again, you simply load *Blinker,* write the master routine to control all the other bits, then type in: BLINK, "SORT", "SAVE", "LOAD", "PRINT", etc.

Now *Blinker* will pull in all these routines from disc, tag them onto the end of your main module, renumber everything, and leave the whole job neat and tidy.

It also tells you how much program memory is being consumed, how much variable memory is available, and will intelligently look for routines that would create an *"Out of Memory"* error, or illegal line numbers.

There are lots of other possibilities too, but what it boils down to is that *Blinker* makes serious program writing a hell of a lot easier.

And there's the rub, as Shakespeare would put it. Who does that much serious programming in 64 Basic? There's also the question of price: *Blinker* will cost you £29.90, which to my mind is precisely £14.95 too much.

So, wonderful as *Blinker* undoubtedly is, I don't see much of a market for it. Pity really, but then I almost never use the Rolls to drop off the laundry either.

Peter Worlock

Program *Blinker-64* **Micro** Commodore 64 with disc drive **Price** £29.90 **Supplier** Indev, 24 Deerings Road, Reigate, Surrey RH2 0PN

The clone of contention

The new Amstrad machine, says John Lettice, is up and running

Amstrad has traditionally made larger and larger piles of money not by stating the obvious so much as by doing it. Obviously there was big money to be made in the home computer market, so the CPC464 was launched. Obviously serious users wanted a complete system that they could use rather than puzzle over, hence the PCW8256 and 8512.

The latest move, the launch of the PC1512 series, is probably the most obvious of the lot. IBM has dominated the business market for the last five years and has sold stacks and stacks of its PCs simply by virtue of the fact that it is IBM. Other business manufacturers have followed the IBM standard, and until recently, when a lot of small companies decided they could put together IBM clones, sell them for half the price of an IBM PC, and still make a profit, the bigger companies were all doing very well for themselves.

Now the obvious bit here is that it needn't actually cost any more to produce a business machine than it does to make any other machine, and that if a company were to produce a PC clone in volume it could sell it at a price low enough to make the business manufacturers lose interest in the PC standard fairly rapidly. That's what Amstrad has done with its PC, and the initial intention is to carve out a large slice of the world market. On first impressions the new machines might just be neat enough and cheap enough to do it.

"The monitor is neatly designed and mounted on a tilt and swivel stand on the top plate"

The machine is simple in construction. It's smaller and lighter than the IBM PC, but the need for $5\frac{1}{4}$ inch disc drives and IBM standard expansion slots has kept its desktop footprint up to around 15 × 15 inches.

The entry-level machine has a single drive plus monochrome monitor, and the series goes up to single drive plus 20Mb hard disc and colour monitor. The review machine's twin floppy drives took up the whole of the front plate of the machine, and being substantial metal-sheathed beasts extended back across half of the machine's base unit.

I/O ports are on the left hand side and around the back. On the left beside the volume control (zero to horrible racket) is the keyboard plug and mouse port. I take it the latter's placing was dictated by circuit board layout, but while I'm happy to meet my first left-handed mouse I'm not sure how the majority of users, who are I believe right-handed, will take to it.

Parallel and serial ports are at the rear, with video output and power input (like other Amstrad machines the power supply goes through the monitor) just along from them.

On most PC compatibles the expansion slots are accessed by unscrewing the casing, generally a fiddly task on a crowded desk, but the Amstrad PC uses a hatch to the rear of the top of the casing plus one on the side for access to

continued on page 18 ▶

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the cards' interfaces. Both these are easily snapped in and out.

The monitor is again neatly designed, and is mounted on a tilt and swivel stand that fits into a well on the top plate. Unlike standard IBMs the monochrome and colour versions use the same video output, with the mono simply showing shades of grey instead of colour,

IBMs also have severe limitations on the number of colours that can be displayed at once – which is why PC games generally have odd colour combinations – but the Amstrad can handle 16 in 80 column mode. It's also compatible with two of the modes available on IBM's EGA (Enhanced Graphics Adaptor), which is more than you can say for most software packages . . .

Screen quality is quite good, although not superb, and this leads on to a major disadvantage. Because the power supply is in the monitor you can't fit third party monitors to the machine without fitting a new power supply or running two monitors. You'd also better be sure of the monitor you want when you buy the machine, because if you upgrade from Amstrad mono to Amstrad colour you'll wind up with a useless mono monitor.

The machine's keyboard is basically IBM format, although there's a separate *Enter* key on the numeric keypad (operation being similar to the one on the PCW), and the *Alt, Control, Caps lock* and *PrtSc* (print screen) keys have been moved to slightly more sensible locations.

The feel of the keys is fine, although I've seen better on machines four or five times the price of the Amstrads. The keyboard also includes a joystick socket, but this apparently emulates the cursor keys rather than being compatible with the standard IBM joystick, so games software will need some amendment.

If you look inside the machine you see what Amstrad really does best. The original IBM machines have sprawling circuit boards populated by large quantities of low-tech chips. The Amstrad on the other hand has its chip set boiled right down, and rather than being socketed (which is cheaper for small runs, but costs more for volume production) most of the chips are surface mounted.

The board takes up around two thirds of the machine's base. The 512K Ram is made up of 256K chips, while the 128K upgrade will consist of 64K chips fitted into sockets alongside. These extend right under drive A, which would have to be removed to gain access to them. What price field upgrades?

The 8086 processor is fairly central, with a socket for the 8087 maths coprocessor alongside it, other major points of interest being several custom chips labelled Amstrad. Developing these will have a cost a packet, but when economies of scale take over they'll make Amstrad's production costs difficult to match.

Operation

Amstrad claims that the machine is spectacularly fast, outrunning all but the Pinnacle, a little-known PC compatible machine. The claims are true, as far as running Basic programs are concerned, but don't really hold water for normal operation. Disc access for a standard *Wordstar* document is marginally faster on the Amstrad than the Bondwell PC, but then again as the Amstrad has the superior 0006 chip running at 8MHz, and the Bondwell has an 8088 running at 4·7MHz, it ought to be a lot faster. The point here is that the basic mechanics of I/O flatten out performance considerably.

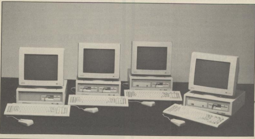
Screen handling is also an impediment to the Amstrad's speed. As far as text display is concerned it's faster than the IBM, but seems lower than the Olivetti M24, which also runs an 8086 at 8MHz. Graphic screens are more significantly slower. The test used here, which I hereby patent, involves *F15 Strike Eagle* software (see last week's issue for review) and time taken to run out of fuel. With afterburners engaged the Amstrad took just under three minutes, wile the Olivetti turned into a brick at just over two.

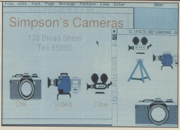
The Amstrad, however, is probably still faster than the IBM in terms of graphics. The spectacular differences in Basic speeds (over twice the speed of the M24) can incidentally be ascribed in part to Locomotive's Basic 2, which is very fast indeed. It also runs under Gem, and together Gem and Basic 2 suck up over 470K of the machine's 512K Ram, but that's another story.

System software

This is probably the most valuable, and unnerving, area of the whole machine. The standard IBM operating system is Microsoft's MSDOS, and this is included. It is, however, also possible to use the machine with a second system, Digital Research's Dos Plus, which is also bundled, and finally it can be run under Gem, DR's windowing front end for the PC. Gem isn't strictly an operating system, but has been pre-installed on a third disc which also includes Dos Plus.

Working out which you'll use is problem enough, but the confusion is heightened by various bits and pieces that





squirt out of the discs as you chug along.

Dos Plus allows a measure of multitasking, and the disc includes a couple of little programs, including an alarm and background printing utility, that take advantage of this. These, however, can only be accessed through Dos Plus, not through MSDOS or Gem. Considering DR wrote both Dos Plus and Gem I'm sure there must be a way to put the two together, but initial phone calls didn't enlighten me.

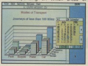
Dos Plus and Gem in fact, although worthwile independently, don't seem to add up to more than the sum of their parts. Exit to Dos from Gem and you can't get back to Gem Desktop. Instead you've got to put the Gem Startup disc back into A, type *autoexec* or *gem* (although the latter appears not to work if you've run a program in the meantime) then reload the Desktop disc. It seems to me that DR ought to be able to make the two systems a lot more integrated than this.

Compatibility

The way to make a machine totally compatible is to make it as slow and horrible as the original IBM. Amstrad to its credit hasn't done this, but the machine is still almost 100 per cent compatible. *Lotus 1-2-3, dBase, Flight Simulator* and *Open Access* all run, and I had no trouble with a fairly wide range of other programs, apart fom *Sargon 3* chess, which seemed reluctant to return to a text screen after going to a graphics display. The latter also, however, gives trouble on the Olivetti, where it crashes whenever it seems to be losing . . .

Hardware compatibility is more difficult to judge, but the machine is likely to be able to take most IBM expansion cards, with a few exceptions.

It won't take an EGA because it can't patch out its own graphics, and extra serial and parallel cards may cause problems depending on which areas of memory they use. The advice here is try before you buy.



Verdict

There are a few disadvantages to the Amstrad machines in absolute terms, but as a total package of software and hardware they're well up in the front runners among PC clones. Take price into account and they have no competition there. Their competition elsewhere really depends on what you want a machine for.

If you want a fast, non-compromise machine at the cutting edge of technology you'd probably look elsewhere, but the Amstrads make no pretence to being this kind of machine.

What they are is cheap, relatively fast machines that run more different software packages than any other micro. At the moment this software is mainly business, but as the support market goes crazy it's inevitable that software of all kinds will be launched for the PC.

So the message is, if you want it for business it's a good buy now (although bear in mind you'll have to buy extra applications software and a printer) while if you are an enthusiast it may be worth your while waiting until the support starts coming through. Either way, at the price it's hard to go wrong.

Machine Amstrad PC1512 **Supplier** Amstrad, Brentwood House, 169 King's Road, Brentwood, Essex CM14 4EF

Prices (all including VAT)

512K machine plus:

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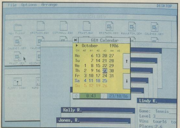
Single drive, 20Mb hard disc, colour	£1,116



October 1986

CW	40	41	42	43	44	45
Mo		6	13	20	27	
Tu		7	14	21	28	
We	1	8	15	22	29	
Th	2	9	16	23	30	
Fr	3	10	17	24	31	
Sa	4	11	18	25		
Su	5	12	19	26		

0:43 23/10/86

Kelly R.

Jones, R.

Lindy K.

Game: Tennis
Level 3
Wins tour16 to
Places:2,6

All three photos above: the uses of a rare Gem

Computer cartoons for the younger generation

Asterix is the most successful atempt yet to create a "cartoon-style" computer game. The graphics are faithful to the spirit of the popular Asterix comic books, and the action is a combination of arcade challenge and simple entertainment.

Asterix, hero of the last Gaulish village still resisting the Roman invaders, must search the countryside for the missing pieces of the Magic Cauldron.

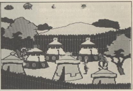
Without these, the village wise-man Getafix cannot brew the magic potion which gives Asterix his irresistible strength.

Asterix and his giant companion Obelix move through some nicely coloured landscapes of trees, villages, Roman forts and deep forests in search of the lost pot.

Movement is three-dimensional and is controlled by joystick, and icons display your position, supplies, amount of magic potion available and so on.

Obelix needs a constant supply of hams, so Asterix must battle wild boar and there are always Roman legionaries must also be fought.

Battles take place in a blown-up section of screen in which the opponents slug it out with punches and kicks, again under joystick control, in a sort of mini-Exploding Fist scenario.


Camp Totorum from Asterix

The music is nice, the graphics are fun, and the game must be quite difficult (since I couldn't get very far with it). However, the scenery takes an annoyingly long time to draw every time Asterix and chums wander from one scene to another and this along with the lack of complex challenges will probably mean that *Asterix* will appeal more to younger players.

Popular Appeal ◆◆◆◆

Chris Jenkins

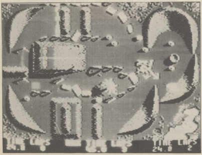
Program *Asterix* **Micro** CBM 64 **Price** £9.95 **Supplier** Melbourne House, High Street, Hampton Wick, Kingston Upon Thames.

BMX Simulator to go platinum

The budget software market, with some justification, has often been compared to the singles record market – but whether that's true or not, *BMX Simulator* (one of the first releases from the new budget software house, Code Masters) possesses many of the virtues a good 45 should have.

It's bright, loud, catchy and it's cheap. In short, everything a budget game should be.

Sequel to that huge seller, *BMX Racers*, this one is an overhead view of various BMX tracks (seven in all) which you race around, challenging either a friend or the computer.



You manouevre your bike round the track using joystick or keyboard. The controls are a doddle – left/right, pressing fire to accelerate, finger off the fire button to brake.

The tracks start off fairly simple with quite a generous time limit, but get much more difficult as time goes on. You soon find yourself having to use the banked corners to get that extra speed.

The actual sound effect produced as you crank the pedals is a bit peculiar; a cross between a steam engine and someone clapping slowly in the middle of the Albert Hall but the finger-clicking music between races makes up for that.

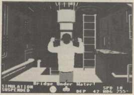
Great fun, especially as a two player game, I'd say it'll go platinum.

Popular Appeal ◆◆◆◆

John Cook

Program *BMX Simulator* **Micro** Commodore 64 **Price** £1.99 **Supplier** Code Masters.

The much too silent service



Pling! Pling! The sonar gave its monotonous warning of the destroyers relentless advance overhead on a nauseatingly clear afternoon in 1944.

The chase had lasted three hours, had seen our deck gun blown to pieces, bow torpedo tubes exhausted, engines and hull damaged. Speaking of the hull, that creaked ominously as we hovered perilously close to our maximum test depth.

The dull boom of the depth charges exploding reverberated in our ears as the submarine shook from end to end from the shock waves. With a tortured howl rivets flew from stanchions and plates buckled and collapsed beneath the awful pressure of being 400 feet underneath the Pacific. Time to surface. Blowing the emergency tanks, we clawed our way upwards.

Unfortunately the cruiser was waiting and no sooner had the conning tower emerged sparkling into the sunlight, than it was blown off.

Thankfully this was the USS PCW undergoing its trials and tribulations in *Silent Service*, the ST conversion, from Micro Prose, so it lived to fight another day.

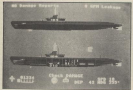
Graphically, this version scores over the C64 original, all the screens, bar the maps, being more detailed, some substantially more. The gameplay is exactly the same but this has a couple of extra missions to take your submarine on.

All is not perfect though. For instance, when on the surface it's impossible to quickly scan around, and if you try looking around, once you get below decks again you'll find the periscope has moved to the direction you last looked in from the tower.

Despite some shortcomings with non-existent sound effects (creaks and damage from depth charges) *Silent Service* is a pretty good game even if it's not quite Das Boot.

Popular Appeal ◆◆◆

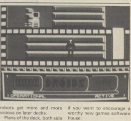
Duncan Evans



One of the silent screens from the silent service

Program *Silent Service* **Micro** Atari ST **Price** £24.95 **Supplier** US Gold, Unit 2–3 Holford Way, Holford, Birmingham B6 7AX.

Droids and robots, arcade and adventure from Anglosoft for your Commodore



It's always good to see a new games software house emerging; Anglosoft isn't a new name, but previous releases have been in the MSX and CBM utilities field.

Droids is a nicely-produced arcade adventure with elements of Hewson's *Paradroid* and Epyx's *Impossible Mission*. The graphics are big and colourful and the programming is pleasantly fast and smooth.

You control a space commando attempting to disable a rogue battlecruiser. The screen shows two levels of deck, plus your score, lives remaining and energy level. Energy pods allow you to replenish lost power.

Scattered around the decks are escalators to allow you to change level, hatches to the next deck and terminals to log on to.

Guard robots have to be zapped or ducked, and once they're all destroyed you can access a terminal, enter the correct code and shut down that deck.

Teleporters enable you to jump from one deck to another, though it can be a shock to find that the guard robots get more and more vicious on later decks.

Plans of the deck, both side views and top, can be called up from the terminals, and there's a challenging little reaction-test involving moving an indicator through moving barriers in order to shut down each deck.

Good fun though not hugely original – worth checking out if you want to encourage a worthy new games software house.

Popular Appeal ◆◆◆

Chris Jenkins

Program *Droids* **Micro** CBM 64 **Price** £8.95 **Supplier** Anglosoft, PO Box 60, Coventry CV1 5SX.

An adventurer's guide to the Hitchhiker's Guide to the Galaxy

The omnipotent Tony Bridge brings you the secret of the Babel fish and more . . .

We looked some weeks ago at the problem of the intelligence screening door in *Hitchhiker's Guide to the Galaxy*, but there is an earlier puzzle that gets everyone tearing their hair out; the getting of the Babel fish!

If you haven't solved this one yet, then you may not know that you need the fish to be able to understand what all that garbage is coming over the intercom (although you will know, if you have consulted the guide, that the Babel fish will allow you to hear any alien language in perfect English).

As you'll know by examining the dispensing machine, there is a source of Babel fish in the vogon hold (by the way, just getting to see in the hold is quite a trick – when you first find yourself in this predicament, just input any old rubbish and watch the responses very carefully, particularly counting the number of senses unavailable to you; it's not the only time that this trick works, so keep it in mind for future use).

> *"Infocom and Douglas Adams are more devious than to allow you a prized object as easily as merely pushing a button! The Babel fish comes out . . . only to disappear from view through a tiny hole in the opposite wall"*

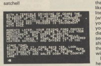
Back to the fish, and you'll naturally press the button on the dispensing machine. But Infocom and Douglas Adams are more devious than to allow you a prized object as easily as merely pushing a button! The fish comes out all right, but sails across the room at knee level to disappear from view through a tiny hole in the opposite wall. Oh dear.

But there is a hook just above the hole, so maybe you could hang something on this hook, thus covering the hole. Ford's towel doesn't, unfortunately, want to stay on the hook, so something else must be tried. At last the trusty dressing gown will come in handy!

So now the hole is covered up, try again. The Babel fish isn't going to give up that easily, however – although it slides down the sleeve of the gown, it then falls to the floor, to disappear through a previously unseen drain. You'll find that the towel is quite large enough to cover the drain (you're right, the dressing gown *isn't*).

But, but . . . As the fish lies there, a tiny cleaning robot whizzes across the floor and, pausing only to grab the fish, disappears through a panel in another wall. Is this fish *ever* going to give up?

Applying what we've learnt so far, we can safely assume that this panel can be covered up too. What else can we use? How about Ford's satchel? He's asleep now, so he won't mind if you prop it against the panel; and this works fine, except that now, wouldn't you just know it, a *second* robot zips in to gracefully catch the fish as it bounces off the satchel!



```
WITH A TERRIBLE GRINDING OF GEARS THE
BULLDOZER COMES TO AN ABRUPT HALT JUST
IN FRONT OF YOU. IT SHAKES, SHUDDERS,
AND EMITS NOXIOUS SUBSTANCES ALL OVER
YOUR ROSE BED. PROSSER IS INCOHERENT
WITH RAGE.

MOMENTS LATER, YOUR FRIEND FORD PREFECT
ARRIVES. HE HARDLY SEEMS TO NOTICE YOUR
PREDICAMENT, BUT KEEPS GLANCING
NERVOUSLY AT THE SKY. HE SAYS "HELLO,
ARTHUR," TAKES A TOWEL FROM HIS BATTERED
LEATHER SATCHEL, AND OFFERS IT TO YOU.

>TAKE TOWEL
AS YOU TAKE IT, FORD SAYS "ER, LOOK,
THANKS FOR LENDING ME THE TOWEL. BEEN
NICE KNOWING YOU. GOT TO GO NOW." HE
SMILES ODDLY AND WALKS DOWN THE COUNTRY
LANE.
>
```

The *Hitchhiker's Guide . . .*

Something else is called for here – if you read that last description about the second robot, there's a germ of an idea there. Now, you *did* bring the junk mail with you, didn't you? I hope so, because that is what we need now – just place it on top of the satchel, press the button one more time, and watch what happens.

At last the Babel fish is yours; but what a marvellous problem, and what a marvellous feeling for the adventurer when finally solved. This kind of thing is what makes Infocom stand head and shoulders above other software houses. Meanwhile, however, don't think that the vogon hold has given up all its secrets . . .

While we're in space, let's take a look at *Rebel Planet* and the peculiar problems that the game from Adventure Soft UK has been posing to players. As you may have gathered from my recent Corners, I find this story quite a refreshing program, and promising for the future of this company.

Although a lot of exploring may be done at the start, the first priority is to get the access card from the galactic travel valet. This is accomplished by talking to it, when the card will be revealed along with the analgesic ampoule and two tickets to Troho.

You'll know from the blurb on the cassette inlay that you must beware of showing weapons to the police or customs. A good way of hiding such things as the laser sword is to use the lite kube. Just *Drop* the object *into Kube* and when needed, *Get* object *from Kube*. Incidentally, the kube will also allow you to carry more objects at one time than would be possible otherwise.

To get through the customs, ensure that all weapons and doubtful objects like the alloy strip etc., are carried in the lite kube. Once you meet the officers (which may take some doing, I can tell you!), you'll need the card at least. Now you'll come across a pair of angry Arcadians who aren't too impressed that you seem to have parked your stupid spaceship right in their parking space! Giving the ticket to them will get rid of them and will also yield up a nice object for you!

Let's finish with a bit more Infocom help. *Wishbringer* is described by the authors as being an adventure for beginners, but as you'd imagine, that doesn't mean that it is in any way a walkover! I haven't got space to go into great detail, but a couple of problems might be giving you a headache if you've just started.

First, don't bother trying to get the chocolate in the police station. Although it is the focus for a spell, you won't actually need that spell during the course of the game. Next, don't get caught by the boot patrol, or you'll land up in jail – the way to avoid them is to simply run in the opposite direction.

You *will* need to get into the jail at a later stage, but this is accomplished by opening the tree stump on Lookout Hill. Once in the jail, you must get the blanket which you must then to use to keep the grue captive. Finally, when in the cinema, look under the seat for something spectacular!

Dungeon Adventure on Spectrum. A severe lack of progress. Any help at all would be appreciated. How do I use those zarking collars? Are there any other light sources apart from the resinous burning wood, and where are they – please! Simon Amos, 22 Albert Road, Tonbridge, Kent TN4 2SR.

The Fantastic Four, part one on BBC B. How does the thing pass the fire in the cavern, and how does the torch move the boulder? Paul Tang, 21 Main Street, Branston, Burton-on-Trent, Staffs DE14 3EY.

Robin of Sherwood on Amstrad CPC 464. I have got one touchstone, but I don't know how to get the others. Gavin Lennon, 10 Earlsvale Road, Cavan, Co Cavan, Eire.

Hampstead on Spectrum. How do you get a job? What do you do with the credit card? What do you do with the lathe bracket? Martyn Cheney, 12 Greenock Street, Armley, Leeds LS12 3JH.

Heroes of Karn on C64. I can't get past the bear. Andrew Lancaster, 16 Anne Close, Christchurch, Dorset BH23 2NW.

Bored of the Rings on Spectrum. How do I get the debugger that is used to kill the kremlins? After climbing down the rope, how do I get it back? Simon Amos, 22 Albert Road, Tonbridge, Kent TN4 2SR.

Crystal Quest on Spectrum. How do I fix the engine malfunction and move the lift on sentinel delta? What next after getting blowpipe? Tony Fox, 15 Spenser Street, Bootle, Merseyside L20 4LN (051-933 6652).

Knight Tyme on MSX. How do I get my photo on to the ID card, having got camera, film, glue, etc? Matthew Palmer, 21 Beaumont Close, Maidenhead, Berkshire SL6 3XN.

The Hobbit on Spectrum. After carrying Bard to the dragon's sleeping place, what should he do to kill the dragon? How does he kill the dragon with bow and arrow? I would be obliged if anyone can come forward with a solution to this problem. G M Petkar, c/o John Harris Assoc, PO Box 214, Muscat, Sultanate of Oman.

The Boggit on Spectrum. How do I get out of the tunnel-like hall? J Haslam, 6 Sittingbourne Avenue, Bush Hill Park, Enfield, Middlesex EN1 2Da.

Questprobe: Torch/Thing on Spectrum. I can't get thing out of the tar-pit, or get into Doctor Doom's castle. Help! Philip May, 73 Fidlas Road, Llanishen, Cardiff, S Glamorgan, Wales CF4 5LX.

Twin Kingdom Valley on Spectrum. How do I kill the witch in the castle of the desert king? Simon Amos, 22 Albert Road, Tonbridge, Kent TN4 2SR.

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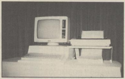

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Mercenary's Second City – the final solution

Tony Kendle begins the first of a series of articles with maps on solving Novagen's classic

This week we start a special treat for *Mercenary* fans – the complete solution and map to the second city, sent in by Christopher Hester, who wrote such an excellent piece on the first game.

Second City is notable as being "the first data set that ever reached the software charts" and it is a testament to the lasting quality of the original game that it was so popular and in no way dated. The forthcoming Amstrad/Spectrum *Mercenary* releases will be the first city but hopefully these games will have provision for the second city releases. The awesome ST version will be a compendium of both cities together with a Targ survival kit of maps and hints. This compendium will also be ready in 8-bit Atari, Commodore 64 and Plus/4 versions.

On with the game. Christopher writes, "The second city is much harder than the original, there are all kinds of traps for you. New features include a cheat room, accessible through any triangular door; there's only one problem – no key!

"There are permanently dark rooms which even a photon emitter cannot light up. These appear orange.

"A lot of rooms appear dark but you could see in them with a photon emitter, but guess what, it's hard to get at the emitter and seemingly impossible to remove it. It lies in a room accessible only by a one way transporter room. Once in the transporter cannot be used again. Are you stuck? The room features two other doors, one of which has a skull and crossbones over it! If you go through that you fall out of the colony craft but fear not, that is what you have to do.

"First you need the antigrav which will let you pick up your ship and when you fall to the ground you simply drop it and off you go again.

"An alternative is to cheat – drop to the ground and drop all your objects. Press *Ctrl-Q* to quit and you get a new ship with all objects still nearby.

"The abundance of darkened rooms means that, unlike before, you can't avoid them to get through. In one of them a key is hidden.

"Another, in the hanger complex 3.04, features six doors, each a different shape. The following tips have been of help here.

"In a lit room if you face a wall and turn about twenty degrees to one side, then move over to the wall, you can force your way along it until you hit a door, which you will go through if it isn't locked. After practising, you'll find any invisible doors if you do the same in a dark room. A wall that has several doors along it is unfortunately a difficult challenge, and you are never sure when you have reached the end of the wall so going right round a dark room is tricky.

"Not all traps are marked by a skull and crossbones – you just have to try each door to see.

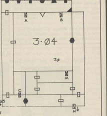
"There is a room where only the lines of the floor are visible, which is one of the three prisons."

More on *Mercenary: Second City*, and more maps next week.

1 – ANTIGRAV
2 – ANTI-TIME BOMB
3 – CATERING PROVISIONS
4 – LARGE BOX
5 – USEFUL ARMAMENT
6 – CHEESE (TABLE)
7 – COFFIN
8 – POWERAMP
9 – KEY ▲
10 – KEY ⬢
11 – KEY ▼
12 – KEY ⌂
13 – KEY ⬟
14 – KEY ■
15 – MECHANOID
16 – WINCHESTER
17 – PASS
18 – MEDICAL SUPPLIES
19 – ENERGY CRYSTAL
20 – SIGHTS
21 – NOVADRIVE
22 – INTERSTELLAR CRAFT
23 – CHEESE
24 – METAL DETECTOR
25 – KITCHEN SINK
26 – ANTENNA
27 – ESSENTIAL 12939 SUPPLY
28 – PHOTON EMITTER
29 – PALYAR DIAMOND SHIP
30 – LAND DART
31 – JET DART
32 – CAR
33 – GOLD (?)

DRAWN BY CHRISTOPHER HESTER

MERCENARY: THE SECOND CITY.



ORANGE WALL-LESS ROOM

DARK ROOM

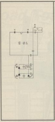
△ – ENTRY POINT TO AUTHOR'S CHEAT ROOM (NO KEY AVAILABLE)

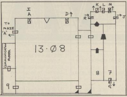
HANGARS AT LOCATIONS:–

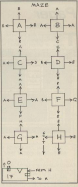
LOC.	COLOUR
3·04	BROWN
5·13	GREY
13·08	GREEN
14·15	CYAN
8·**	CYAN
**·08	BROWN
COLONY CRAFT	BLUE

OBJECTS OUTSIDE CITY:–

LOC.	NAME
8·69	SHIP?
8·$\boxed{96}$	PYRAMID







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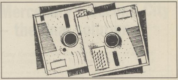
Programming: BBC

Pager

by Alan Griffiths



This program lists the names of all the Roms present in the machine in order of socket number. It also gives the Rom number indicating service and language entry points and allows any Rom to be switched off by poking zero into the relevant paged Rom type table at &2A1.

Note that pressing *Break* will turn all the Roms back on again.

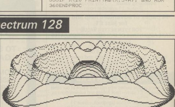
```
   10ON ERROR MODE 7:END
   20MODE 7:X=16
   25VDU23;8202;0;0;0;
   30PRINTTAB(1,1);" SOCKET";TAB(3,2);"
NO.";TAB(10,1);" ROM ";TAB(10,2);" NO.";
TAB(15,2);" TITLE";TAB(27,2);" STATUS"
   40FOR A=0 TO 15
   50B=&2A1+A
   60PRINTTAB(4,5+A);A;TAB(11,5+A);?B;"
 "
   70IF ?B>0 PROCNAME
   80IF ?B=0 PRINTTAB(15,5+A);CHR$(131);

TAB(29,5+A);" OFF" ELSE PRINTTAB(29,5+A)
;" ON"
   90 NEXT
  100PRINTTAB(1,22);"PRESS SPACE BAR TO
ALTER STATUS"
  110PRINTTAB(12,23);"ESC TO END"
  120REPEAT:UNTIL INKEY-99:PROCSTATUS:GO
TO30
  130END
  140DEFPROCSTATUS
  150PRINTTAB(1,22);"
                            "
  160INPUTTAB(1,22);"SOCKET",C
  170IF C<0 OR C>15 GOTO160
  180?(&2A1+C)=0
  190ENDPROC
  200DEFPROCNAME
  210@%=10
  220start=&8009
  230pointer=0:X=16
  240REPEAT
  250location=start+pointer
  260Y%=A
  270?&F6=location MOD 256
  280?&F7=location DIV 256
  290result%=USR(&FFB9)
  300PRINTTAB(15,5+A);CHR$(130)
  310byte=result% AND 255
  320IF byte>31 AND byte<128 PRINTTAB(X,
5+A);CHR$(byte)
  330pointer=pointer+1
  340X=X+1
  350UNTIL pointer=12 OR byte=0
  355IF X<20 PRINTTAB(X,5+A);"&NO ROM"
  360ENDPROC
```

Programming: Spectrum 128

Wobbling Jellies

by M D Lancaster



The following program for the 128K Spectrum will produce fast and complex animation routines.

This is done by storing the screen display as frames in the Ram disc and then using *Load!* to replay them in sequence.

If the program is *Run* it will generate the plots and save them to *Ram* before giving the option of saving the frames to cassette or microdrive. However, since the function used is a complex one the demonstration will take two hours to be generated.

This idea of using the *Ram* disc to store clean frames in can be applied in various way to create fast animation.

The above illustration is an example of the "wobbly jelly". The listing for this program begins on the following page.

```
  10 REM
  20 REM Set up initial vaiables and loo
ps.
  30 REM
  40 LET c=0
  50 FOR t = 0.1 TO 7 STEP (7/13)
  60 REM
  70 REM Function to be plotted.
  80 REM
  90 DEF FN a(x,y)=t*EXP (2*COS ((x*x+y*
y)*.001))
 100 FOR x=0 TO 127
 110 LET y=SQR (16129-x*x)
 120 LET m=-1e9
 130 FOR z=-y TO y STEP 4
 140 LET k=FN a(x,z)
 150 LET p=k+z/4+88
 160 IF p<=m THEN  GO TO 190
 170 LET m=p
 180 PLOT 128+x,p: PLOT 128-x,p
 190 NEXT z
 200 NEXT x
 210 REM
 220 REM Save screen to ram disc.
 230 REM
 240 SAVE !CHR$ (65+c)CODE 16384,6144
 250 CLS
 260 LET c=c+1
 270 NEXT h
 280 GO TO 630
 290 REM
 300 REM Display sequence of 12 frames.
 310 REM
 320 CLS
 330 FOR f = 65 TO 76
 340 LOAD !CHR$ (f)CODE
 350 NEXT f
 360 FOR f = 75 TO 66 STEP -1
 370 LOAD !CHR$ (f)CODE
 380 NEXT f
 390 GO TO 330
 400 REM
 410 REM Routine to load frames from ram
 disc and save to microdrive.
 420 REM
 430 CLS : PRINT AT 5,3;"Insert a cartri
dge with";AT 7,3;"at least 90K of free s
pace."
 440 PRINT AT 9,3;"Press any key when re
ady"
 450 PAUSE 0
 460 FOR f = 65 TO 76
 470 LOAD !CHR$ (f)CODE
 480 SAVE *"m";1;CHR$ (f)CODE 16384,6144
 490 NEXT f
 500 SAVE *"m";1;"function" LINE 550
 510 GO TO 290
 520 REM
 530 REM Load frames from microdrive and
 save to ram disc.
 540 REM
 550 FOR f = 65 TO 76
 560 LOAD *"m";1;CHR$ (f)CODE
 570 SAVE !CHR$ (f)CODE 16384,6144
 580 NEXT f
 590 GO TO 290
 600 REM
 610 REM Frames now generated prompt for
 storage mecia.
 620 REM
 630 PRINT AT 5,3;"Save to <M>icrodrive,
"
 640 PRINT AT 7,3;"     or <T>ape."
 650 INPUT a$
 660 IF a$="m" OR a$="M" THEN  GO TO 400
 670 IF a$<>"t" AND a$<>"T" THEN  GO TO
650
 680 REM
 690 REM save to tape
 700 REM
 710 SAVE "function" LINE 800
 720 FOR f = 65 TO 76
 730 LOAD !CHR$ (f)CODE
 740 SAVE CHR$ (f)CODE 16384,6144
 750 NEXT f
 760 GO TO 290
 770 REM
 780 REM load frames from tape and save
to ram disc.
 790 REM
 800 FOR f = 65 TO 76
 810 LOAD CHR$ (f)CODE
 820 SAVE !CHR$ (f)CODE 16384,6144
 830 NEXT f
 840 GO TO 290
```

Programming: QL

Multi Sided Shapes

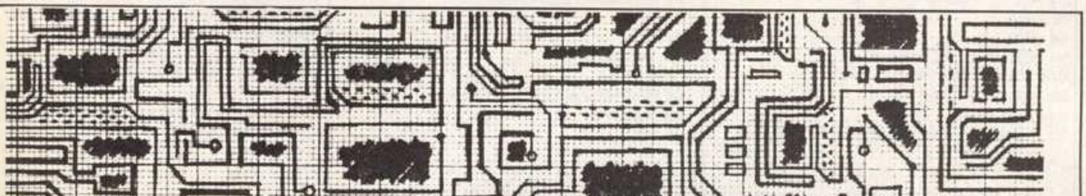
by Stephen Salmon

This program runs on a non-expanded QL using a monitor, although line 180 can be changed to *Mode 8* to suit a TV.

When the program is first run an opening demonstration screen is drawn showing the three options available. These are displayed in the menu in the bottom right hand corner of the screen.

Multi Sided Shapes is made up of three procedures which can be incorporated into your own programs. These are *Shapes*, *Prisms* and *Plains*.

Shapes will draw polygons, the pattern of which can be altered by changing the value of *Step* in line 1530. The *Prisms* procedure draws them with both ends open. The patterns can be altered by introducing a *Step* command into line 1770. The pattern produced by the *Plains* procedure can also be altered by changing the *Step* value in line 1990. The positions of the displays can be altered by using the *X-Centre* and *Y-Centre* values.



```
170 WINDOW#0,512,10,0,246
180 MODE 4
190 PAPER 254
200 CLS
210 LET LIMIT=50
220 LET NUMBER_OF_SIDES = 5
230 WINDOW#1,256,123,0,0
240 MULTI_SIDED_SHAPES
250 CSIZE 2,0
260 CURSOR #1,0,80
270 PRINT"SHAPES"
280 CURSOR #1,0,0
290 PRINT "[1]"
300 WINDOW#1,256,123,256,0
310 LIMIT = 40
320 DEPTH = 70
330 NUMBER_OF_SIDES=7
340 PRISM
350 INK 0
360 PRINT "[2]"
370 CURSOR #1,0,85
380 PRINT "PRISMS"
390 WINDOW #1,256,123,0,123
400 NUMBER_OF_PLAINS = 4
410 plains
420 INK 0
430 CURSOR #1,0,0
440 PRINT "[3]"
450 CURSOR #1,0,90
460 PRINT "PLAINS"
470 MENU
510 DEFine PROCedure MENU
520 WINDOW #1,256,123,256,123
540 CLS:PAPER #1,7,2:CLS
560 INK #1,0
570 CSIZE 3,1
580 PRINT"      MENU"
590 CSIZE 2,0
600 PRINT
610 PRINT"  [1]   SHAPES"
620 PRINT"  [2]   PRISMS"
630 PRINT"  [3]   PLAINS"
640 PRINT
650 UNDER 1
660 PRINT"  PRESS KEY FOR              PROGRAM .....    "
670 UNDER 0
680 IF INKEY$="1" THEN MULTIIN
690 IF INKEY$="2" THEN PRISMIN
700 IF INKEY$="3" THEN PLAININ
710 GO TO 680
720 END DEFine MENU
740 DEFine PROCedure MULTIIN
750 CLS
760 CSIZE 3,1
770 PRINT "     SHAPES "
780  PRINT
790 CSIZE 2,0
800 PRINT" INPUT THE NUMBER OF
SIDES YOU WISH YOUR  SHAPE TO HAVE"
805 PRINT"IN THE RANGE 3 to 20"
810  INPUT NUMBER_OF_SIDES
820 IF NUMBER_OF_SIDES<3 OR NUMBER_OF_SIDES>20
THEN GO TO 810
830 PRINT "INPUT THE SIZE  10-50"
840 INPUT LIMIT
850 IF LIMIT<10 OR LIMIT>50 THEN GO TO 840
860 CLS
870 WINDOW#1,512,246,0,0
880 MULTI_SIDED_SHAPES
890 CSIZE 3,1
900 CURSOR #1,0,0
910 INK 0
920 PRINT NUMBER_OF_SIDES;" SIDES"
930 CURSOR#1,0,180
940 CSIZE 2,1
950 PRINT"PRESS ANY KEY"
960 PAUSE 99999
970 MENU
980 END DEFine MULTIIN
1000 DEFine PROCedure PRISMIN
1020 CLS:INK 0
1030  CSIZE 3,1
1040 PRINT"    PRISMS"
1050 CSIZE 2,0
1060 PRINT
1070 PRINT"INPUT THE NUMBER OF"
1075 PRINT"SIDES YOU WANT TO YOUR OPEN ENDED"
1078 PRINT"PRISM 4-15"
1080 INPUT NUMBER_OF_SIDES
1090 IF NUMBER_OF_SIDES<4 OR NUMBER_OF_SIDES>15
THEN GO TO 1080
1100 PRINT "INPUT DEPTH 10-90"
1110 INPUT DEPTH
1120 IF DEPTH<10 OR DEPTH>90 THEN GO TO 1110
1130 PRINT "INPUT SIZE 10-50"
1140 INPUT LIMIT
1150 IF LIMIT<10 OR LIMIT>50 THEN GO TO 1140
1170 CLS:WINDOW#1,512,246,0,0
1180 PRISM
1190 CSIZE 3,0
1200 CURSOR #1,0,215
1210 INK 0
1220 PRINT "PRESS ANY KEY"
1230  PAUSE 99999
1240 MENU
1250 END DEFine PRISMIN
1270 DEFine PROCedure PLAININ
1290 CLS:CSIZE 3,1
1300 PRINT"    PLAINS"
1310 PRINT
1320 CSIZE 2,0
1330 PRINT"INPUT THE THE NUMBER OF PLAINS YOU"
1336 PRINT"WANT ON THE SCREEN IN THE RANGE 3-25"
1340 INPUT NUMBER_OF_PLAINS
1350 IF NUMBER_OF_PLAINS<3 OR  NUMBER_OF_
PLAINS>25 THEN GO TO 1340
1370 CLS:WINDOW#1,512,246,0,0
1380 plains
1390 INK 0
1400 CURSOR#1,0,0
1410 CSIZE 3,1
1420 PRINT"PRESS ANY KEY"
1430 PAUSE 99999
1440 MENU
1450 END DEFine PLAININ
1490 DEFine PROCedure MULTI_SIDED_SHAPES
1510 CLS:BORDER 15,30
1520 PAPER 254
1530 FOR OUTLINE = 0 TO LIMIT STEP .5
1540 X_CENTRE = 95
1550 Y_CENTRE = 50
1560 HORIZONTAL = X_CENTRE - OUTLINE
1570 VERTICAL = Y_CENTRE
1580 FOR P=0 TO 361 STEP 360/NUMBER_OF_SIDES
1590 LET HORIZONTAL_2 = X_CENTRE - OUTLINE * COS
(P*PI/180)
1600 LET VERTICAL_2 = Y_CENTRE + OUTLINE * SIN
(P*PI/180)
1610 INK P/NUMBER_OF_SIDES
1620 LINE HORIZONTAL,VERTICAL TO HORIZONTAL_2,
VERTICAL_2
1630 HORIZONTAL = HORIZONTAL_2
1640 VERTICAL = VERTICAL_2
1650 END FOR P
1660 END FOR OUTLINE
1670 END DEFine MULTI_SIDED_SHAPES
1710 DEFine PROCedure PRISM
1720 Y_CENTRE = 50
1730 X_CENTRE = 110
1750 CLS:PAPER 254
1760 BORDER #1,10,55
1770 FOR PRISM_LOOP = 1 TO DEPTH
1780 HORIZONTAL=X_CENTRE-LIMIT
1790 VERTICAL=Y_CENTRE
1800 FOR P=0 TO 361 STEP 360/NUMBER_OF_SIDES
1810 HORIZONTAL_2 = X_CENTRE - LIMIT
* COS(P*PI / 180)
1820 VERTICAL_2 = Y_CENTRE + LIMIT * SIN(P*PI / 180)
1830 INK P/NUMBER_OF_SIDES
1840 LINE HORIZONTAL,VERTICAL TO HORIZONTAL_2,
VERTICAL_2
1850 HORIZONTAL = HORIZONTAL_2
1860 VERTICAL = VERTICAL_2
1870 END FOR P
1880 LET X_CENTRE = X_CENTRE -.5
1890 LET Y_CENTRE = Y_CENTRE
1900 END FOR PRISM_LOOP
1910 END DEFine PRISM
1950 DEFine PROCedure plains
1960 PAPER 254
1970 BORDER #1,10,33
1990 CLS:FOR a=30 TO 90 STEP .75
2000 LET X_CENTRE=130:LET Y_CENTRE=90
2010 LET HORIZONTAL=X_CENTRE - a
2020 LET VERTICAL = Y_CENTRE
2030 FOR B=0 TO 361 STEP 360/(NUMBER_OF_PLAINS-1)
2040 LET HORIZONTAL_2=X_CENTRE - a*COS (B*PI/180)
2050 LET VERTICAL_2=Y_CENTRE + a*SIN (B*PI/180)
2060 INK B/NUMBER_OF_PLAINS/2
2070 LINE HORIZONTAL,VERTICAL TO HORIZONTAL_2 -
HORIZONTAL,VERTICAL_2 - VERTICAL
2080 LET HORIZONTAL = HORIZONTAL_2
2090 LET VERTICAL = VERTICAL_2
2110 NEXT B:NEXT a
2120 END DEFine plains
2140 SAVE MDV1_BOOT
```

Road Toad

by Graham Tyson

On we go with part two of Road Toad. The line numbers must remain exactly as printed or the error checking routine will report a fault in the wrong place.

If you can't be bothered with the typing then send £2 (no cheques) to 39 York House, Idlethorp-Way, Thorpe Edge, Bradford BD10 9ES.

```
233 DATA 61,7F,C6,10,47,3A,60,7F,FE,10,30,10,3C,32,60,7F,CD,26,BC,3A,5E, 2040
234 DATA 7F,3D,32,5E,7F,18,27,B8,30,06,3C,32,60,7F,18,1E,3E,10,80,47,3A, 1482
235 DATA 60,7F,B8,30,10,3C,32,60,7F,CD,29,BC,3A,5E,7F,3C,32,5E,7F,18,04, 1876
236 DATA AF,32,60,7F,22,9B,7E,11,9D,7E,EB,06,10,C5,01,0A,00,ED,B0,01,F6, 2188
237 DATA 07,EB,09,3E,BF,BC,38,04,01,50,C0,09,EB,C1,10,E8,C9,00,00,00,00, 1911
238 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
239 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
240 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
241 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
242 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
243 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
244 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
245 DATA 00,00,00,00,00,00,00,00,00,00,00,11,94,00,21,15,00,CD,C0,BB,21, 836
246 DATA 59,7F,06,05,3E,F6,86,C5,E5,CD,FC,BB,E1,23,C1,10,F3,C9,00,00,00, 2652
247 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
248 DATA 00,00,00,00,00,00,00,00,00,00,53,43,4F,52,45,4C,45,56,45,4C,DD, 977
249 DATA 21,AB,83,06,10,11,DC,7F,E5,C5,06,04,E7,12,4F,D0,7E,00,FE,00,28, 2126
250 DATA 32,CB,47,20,02,E6,EE,CB,4F,20,02,E6,DD,CB,57,20,02,E6,BB,CB,5F, 2632
251 DATA 20,02,E6,77,CB,67,20,02,E6,EE,CB,6F,20,02,E6,DD,CB,77,20,02,E6, 2576
252 DATA 9B,CB,7F,20,02,E6,77,B1,77,13,23,DD,23,10,BE,C1,E1,CD,26,BC,10, 2577
253 DATA B3,C9,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 380
254 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
255 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
256 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
257 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
258 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
259 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
260 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
261 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00, 0
262 DATA 00,00,00,00,00,06,10,C5,E5,D1,1B,1A,01,47,00,E5,F5,ED,B0,F1,12, 1928
263 DATA E1,01,00,08,09,3E,BF,BC,38,04,01,50,C0,09,C1,10,E1,C9,06,10,C5, 1880
264 DATA E5,D1,13,1A,F5,01,47,00,E5,ED,B0,E1,F1,12,01,00,08,09,3E,BF,BC, 2393
265 DATA 38,04,01,50,C0,09,C1,10,E1,C9,06,10,C5,E5,D1,1B,1A,47,1B,1A,4F, 1890
266 DATA C5,01,46,00,E5,ED,B0,E1,01,00,08,09,3E,BF,BC,38,04,01,50,C0,09, 1936
267 DATA C1,79,12,13,78,12,C1,10,D9,C9,06,10,C5,E5,D1,13,1A,47,13,1A,4F, 2013
268 DATA C5,01,46,00,E5,ED,B8,E1,01,00,08,09,3E,BF,BC,38,04,01,50,C0,09, 1944
269 DATA C1,79,12,78,1B,12,C1,10,D9,C9,21,AB,84,11,08,C0,06,01,CD,5D,82, 2112
270 DATA 21,6B,84,11,10,C0,06,01,CD,5D,82,21,2B,84,11,30,C0,06,01,CD,5D, 1714
271 DATA 82,21,EB,83,11,44,C0,06,01,CD,5D,82,C9,2A,9B,7E,EB,21,6B,85,06, 2279
272 DATA 01,CD,5D,82,2A,9B,7E,11,04,00,19,EB,21,2B,85,06,01,CD,5D,82,2A, 1719
273 DATA 9B,7E,11,08,00,19,EB,21,EB,84,06,01,CD,5D,82,C9,21,2B,86,11,FE, 2083
274 DATA C0,06,01,CD,5D,82,21,EB,85,11,02,C1,06,01,CD,5D,82,21,AB,85,11, 2029
275 DATA 06,C1,06,01,CD,5D,82,C9,21,A3,87,11,1C,C1,06,01,CD,5D,82,21,63, 1971
276 DATA 87,11,20,C1,06,01,CD,5D,82,21,23,87,11,24,C1,06,05,CD,5D,82,21, 1733
277 DATA E3,86,11,38,C1,06,01,CD,5D,82,21,6B,86,11,27,E1,06,08,C5,D5,01, 2042
278 DATA 0F,00,ED,B0,D1,EB,CD,26,BC,EB,C1,10,F0,C9,11,64,C4,06,09,CD,2E, 2767
279 DATA 82,11,92,C4,06,04,CD,2E,82,11,82,C5,06,05,CD,2E,82,11,6E,C5,06, 1946
280 DATA 03,CD,2E,82,11,56,C5,06,04,CD,2E,82,11,56,C6,06,07,CD,2E,82,11, 1787
281 DATA 7C,C6,06,03,CD,2E,82,C9,C5,D5,21,63,88,06,01,CD,5D,82,E1,11,04, 2272
282 DATA 00,19,EB,21,23,88,C1,05,05,C5,D5,CD,5D,82,E1,C1,48,06,00,CB,21, 2237
283 DATA CB,21,09,EB,21,E3,87,06,01,CD,5D,82,C9,C5,E5,D5,06,10,C5,01,04, 2374
284 DATA 00,D5,ED,B0,D1,EB,CD,26,BC,EB,C1,10,F0,E1,11,04,00,19,EB,E1,C1, 3109
285 DATA 10,E1,C9,11,00,C0,CD,C8,82,11,70,C3,CD,C8,82,11,30,C7,CD,C8,82, 2844
286 DATA 21,08,C0,06,04,C5,E5,11,10,04,0E,00,CD,47,BC,E1,01,14,00,09,C1, 1632
287 DATA 10,EE,21,A9,DB,11,0B,16,0E,00,CD,47,BC,21,31,DF,11,0B,1C,0E,00, 1578
288 DATA CD,47,BC,21,71,DB,11,0B,16,0E,00,CD,47,BC,C9,06,0A,C5,D5,21,A3, 2190
```

continued on page 30 ▶

Programming: Amstrad 464

```
289 DATA 88,06,10,C5,01,08,00,D5,ED,B0,D
1,EB,CD,26,BC,EB,C1,10,F0,E1,11, 2791
290 DATA 08,00,19,EB,C1,10,E0,C9,00,01,0
2,00,00,09,30,00,10,C0,00,70,C1, 1487
291 DATA 06,40,E0,60,20,14,80,30,05,80,2
0,80,18,20,01,00,90,02,10,81,10, 1275
292 DATA 40,0C,06,50,07,18,82,08,80,03,0
8,30,80,14,81,30,E0,00,00,40,41, 1196
293 DATA 14,81,40,10,81,0C,81,20,18,40,0
0,00,01,00,00,00,10,40,77,77,44, 1006
294 DATA 77,77,22,20,20,44,55,45,55,22,2
2,40,30,77,77,45,77,22,2A,81,18, 1478
295 DATA 11,44,44,55,22,00,40,20,77,44,7
7,55,22,22,20,40,08,01,00,00,01, 933
296 DATA 00,28,81,00,81,20,02,80,60,10,8
0,0A,40,40,02,70,80,14,82,05,30, 1283
297 DATA 81,0F,30,02,18,80,04,38,00,08,5
0,01,14,40,08,40,80,10,82,82,20, 1087
298 DATA 40,00,82,70,E0,02,40,40,30,F0,0
2,02,00,04,30,80,08,02,04,04,0E, 1164
299 DATA 04,08,02,04,08,04,02,00,08,04,0
1,00,00,00,00,88,11,88,11,88,33, 538
300 DATA CC,11,CC,77,EE,33,66,77,EE,66,7
7,9F,9F,EE,33,DF,BF,CC,11,FF,FF, 3265
301 DATA 88,11,AA,EE,88,11,FF,BB,88,FF,5
5,FF,FF,FF,FF,55,FF,DD,DD,FF,33, 3723
302 DATA CC,77,EE,33,88,00,00,11,88,00,0
0,11,00,07,0C,00,02,01,00,04,04, 948
303 DATA 0D,06,02,02,01,00,04,09,01,01,0
9,02,C0,60,04,18,20,90,01,08,C0, 743
304 DATA 90,01,1C,20,90,07,18,20,90,01,0
A,C0,60,05,01,01,01,08,02,01,00, 874
305 DATA 04,04,0D,06,02,02,01,00,04,00,0
7,0C,00,00,02,00,00,44,77,EE,22, 514
306 DATA 22,88,11,44,11,33,CC,88,22,00,0
0,44,AA,08,06,55,AA,08,09,55,AA, 1476
307 DATA 08,09,55,AA,0A,09,55,AA,0E,09,5
5,AA,02,06,55,22,00,00,44,11,33, 1087
308 DATA CC,88,22,88,11,44,44,77,EE,22,0
0,00,00,00,00,00,00,00,0F,0F,0F, 1099
309 DATA 0F,08,00,00,01,0B,08,01,0D,0A,0
0,00,05,0A,44,66,05,08,AA,99,01, 589
310 DATA 08,22,99,01,08,44,99,01,08,88,9
9,01,0A,EE,66,05,0A,00,00,05,0B, 1105
311 DATA 08,01,0D,08,00,00,01,0F,0F,0F,0
F,00,00,00,00,00,00,30,80,00,F0, 507
312 DATA 40,40,10,00,90,20,10,60,80,A0,2
0,00,90,20,40,44,66,20,A0,CC,99, 1711
```

```
313 DATA 40,90,44,99,20,40,44,99,10,30,4
4,99,50,40,EE,66,10,90,10,00,90, 1835
314 DATA A0,10,20,60,80,A0,80,80,40,20,7
0,00,30,C0,00,00,00,00,00,00,00, 1296
315 DATA 00,00,00,00,00,00,00,00,00,00,0
0,00,00,00,00,00,00,00,00,00,00, 0
316 DATA 00,00,00,00,00,00,00,00,00,00,F
0,E0,00,00,F0,F0,00,00,F0,E0,00, 1408
317 DATA 00,00,00,00,00,00,00,00,00,00,0
0,00,00,00,00,00,00,F0,C0,00,00, 432
318 DATA 96,F0,00,00,D2,F0,80,00,D2,F0,8
0,00,D2,F0,80,00,D2,F0,90,20,96, 2984
319 DATA F0,00,30,F0,C0,C0,10,4B,0C,77,D
C,4B,1F,FF,FE,4B,1F,FF,F6,4B,1F, 2490
320 DATA FF,FE,4B,0C,77,DC,00,00,00,10,0
0,00,00,30,00,00,00,20,00,00,70, 1143
321 DATA F0,00,00,F0,F0,00,00,F0,F0,00,0
0,F0,F0,00,00,F0,F0,00,00,F0,F0, 2640
322 DATA 00,00,F0,F0,00,00,70,F0,00,00,0
0,0F,00,F0,E1,0F,10,F0,E1,0F,00, 1823
323 DATA F0,E1,0F,00,00,00,0F,00,00,00,0
0,00,00,00,00,00,00,00,00,07,0F, 517
324 DATA 0F,08,0F,0F,0F,0C,16,F0,F0,0C,0
7,0F,1E,2C,07,0F,1E,2C,07,0F,1E, 838
325 DATA 2C,07,0F,1E,2C,07,0F,1E,0C,07,0
F,1E,0C,07,0F,1E,2C,07,0F,1E,2C, 460
326 DATA 07,0F,1E,2C,07,0F,1E,2C,16,F0,F
0,0C,0F,0F,0F,0C,07,0F,0F,08,0F, 823
327 DATA 0F,0F,0F,00,01,00,00,0F,0F,0F,0
F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F, 256
328 DATA 0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0
F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0F, 315
329 DATA 0F,0F,0F,0F,0F,0F,0F,0F,0F,0F,0
F,0F,0F,00,01,00,00,0F,0F,0F,0F, 256
330 DATA 03,0F,0F,0C,07,0F,0F,0B,07,0F,0
F,08,87,0F,0F,08,87,0F,0F,08,87, 619
331 DATA 0F,0F,08,07,0F,0F,08,16,F0,E1,0
8,16,F0,E1,08,07,0F,0F,08,87,0F, 1268
332 DATA 0F,08,87,0F,0F,08,87,0F,0F,08,0
7,0F,0F,08,07,0F,0F,08,03,0F,0F, 495
333 DATA 0C,0F,C3,3C,87,78,0F,1E,87,69,1
E,0F,0F,87,0F,3C,96,E1,78,3C,3C, 1707
334 DATA 96,C3,C3,F0,3C,E1,78,C3,F0,B4,9
6,E1,69,78,96,96,C3,C3,F0,3C,E1, 3615
335 DATA 78,C3,D2,F0,96,E1,69,78,96,96,C
3,C3,C3,78,E1,78,C3,1E,F0,C3,0F, 3390
336 DATA E1,78,96,87,1E,C3,0F,F0,E1,78,C
3,1E,F0,F0,3C,E1,78,96,96,3C,C3, 3120
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337 DATA C3,78,E1,78,C3,D2,F0,F0,3C,F0,3
C,3C,96,96,C3,F0,3C,E1,78,C3,F0, 3540
338 DATA B4,E1,1E,F0,87,78,0F,87,87,69,1
E,0F,0F,87,0F,3C,F0,00,00,00,F0, 2070
339 DATA 80,00,00,FE,80,00,00,F6,80,00,0
0,F6,80,00,00,F6,80,00,00,F6,80, 2066
340 DATA 00,00,F6,80,00,00,F6,80,00,00,F
6,80,00,00,F6,80,00,00,F6,80,00, 1870
341 DATA 00,F6,80,00,00,FE,80,00,00,F0,8
0,00,00,F0,00,00,00,F0,F0,F0,F0, 2324
342 DATA F0,F0,F0,F0,FF,FF,FF,FF,F0,F0,F
0,F0,F0,F0,F0,F0,F0,F0,F0,F0,F0, 5100
343 DATA F0,F0,F0,F0,F0,F0,F0,F0,F0,F0,F
0,F0,F0,F0,F0,F0,F0,F0,F0,F0,F0, 5040
344 DATA F0,F0,F0,F0,F0,F0,FF,FF,FF,FF,F
0,F0,F0,F0,F0,F0,F0,F0,00,00,00, 4380
345 DATA F0,0E,00,10,F0,1E,00,10,F7,1E,F
F,FE,F4,1E,FF,FE,F4,1E,00,10,F4, 2659
346 DATA 1E,00,10,F4,1E,05,14,F4,1E,0A,1
A,F4,1E,00,10,F4,1E,00,10,F4,1E, 1509
347 DATA FF,FE,F4,1E,FF,FE,F4,1E,00,10,F
7,0E,00,10,F0,00,00,00,F0,00,00, 2339
348 DATA 00,00,00,00,01,0F,00,03,0F,0F,3
0,F0,C3,0F,71,FF,CB,0F,F2,F0,C3, 1810
349 DATA 0F,F4,F0,C3,0F,F4,F0,C3,0F,F4,F
0,C3,0F,F4,F0,C3,0F,F2,F0,C3,0F, 3483
350 DATA 71,FF,CB,0F,30,F0,C3,0F,00,03,0
F,0F,00,00,01,0F,00,00,00,00,00, 1133
351 DATA 00,00,00,0F,0F,0F,08,0F,0F,F0,0
C,00,01,F7,86,0F,01,F7,CA,0F,0F, 1212
352 DATA F7,CB,F0,F0,F7,ED,FE,FF,FF,ED,F
E,FF,FF,ED,F0,F0,F7,ED,0F,0F,F7, 4657
353 DATA CB,0F,01,F7,CA,00,01,F7,86,0F,0
F,F0,0C,0F,0F,0F,08,00,00,00,00, 1385
354 DATA 00,00,00,00,0F,0E,07,0F,0F,0F,0
F,0F,00,00,00,00,0F,0F,0F,0F,0F, 186
355 DATA 0F,0F,0F,F0,F0,F0,F0,FD,FF,FF,F
B,FD,FF,FF,FB,F0,F0,F0,F0,0F,0F, 4023
356 DATA 0F,0F,0F,0F,0F,0F,00,00,00,00,0
F,0F,0F,0F,0F,0E,07,0F,00,00,00, 201
357 DATA 00,00,00,00,00,01,0F,0F,0F,03,F
0,0F,0F,16,FE,08,00,35,FE,08,0F, 933
358 DATA 3D,FE,0F,0F,7B,FE,F0,F0,7B,FF,F
F,F7,7B,FF,FF,F7,7B,FE,F0,F0,3D, 3880
359 DATA FE,0F,0F,35,FE,08,0F,16,FE,08,0
0,03,F0,0F,0F,01,0F,0F,0F,00,00, 1217
360 DATA 00,00,30,60,10,00,10,00,30,60,F
0,F0,30,C0,70,C0,F0,F0,F0,F0,F0, 2544
```

Programming: C64

Minz

by Ken Smith

The object of Minz is to destroy the targets in nine locations whilst avoiding, or shooting, the rocket, balloon and helicopter. Also to be avoided are the mines which appear at the start of a screen before becoming invisible. Full instructions are given in the program.

The listing is quite long and will be presented over three weeks, so if you don't want to type it in send £2 to Ken Smith, 73 Wakefield Street, East Ham, London E6 1NR for a copy on cassette.

```
10 FORJ=33280TO40965:READV:POKEJ,V:NEXT
30 SYS37000
70 POKE53280,0:POKE53281,0:POKE252,0:POKE646,7
90 V=53248
130 POKEV+28,255:POKEV+37,7:POKEV+38,2
140 POKEV+39,6:POKEV+40,0:POKEV+41,6:POKEV+42,2:POKEV+43,7:POKEV+44,3
150 POKEV+45,6:POKEV+46,6:POKE36855,37
160 POKE36856,41:POKE36857,38:POKE36858,42:POKE36859,39:POKE36860,40
161 POKE36861,44:POKE36862,46:POKEV,90:POKEV+1,64:POKEV+2,90:POKEV+3,96
162 POKEV+4,90:POKEV+5,132:POKEV+6,90:POKEV+7,160:POKEV+8,90:POKEV+9,200
163 POKEV+10,255:POKEV+11,64:POKEV+12,255:POKEV+13,100
1670 POKEV+21,0:POKEV+16,0:PRINT"█████████████████MINZ"
1680 PRINT"████YOU HAVE FOUR TANKS TO DESTROY THE"
1690 PRINT"█TARGETS IN NINE LOCATIONS."
1700 PRINT"████COLLISION WITH ANY OBJECT DESTROYS A"
1710 PRINT"█TANK."
1720 PRINT"████MINES (") ARE HIDDEN BUT ARE VISIBLE"
1730 PRINT"█BEFORE EACH TANK SETS OUT."
1740 PRINT"█████PRESS RETURN":POKE198,0
1750 GETA$:IFA$=CHR$(13)THEN1770
1760 GOTO 1750
1770 PRINT"█████████████████MINZ"
1780 PRINT"████DESTROY THE FIVE TARGETS AND THE SCREEN"
1790 PRINT"██IS RESET. MINES ARE REPOSITIONED."
1800 PRINT"████DESTROY FIFTEEN TARGETS AND YOU MOVE"
1810 PRINT"█TO THE NEXT LOCATION. AN EXTRA TANK"
1820 PRINT"█WILL BE GIVEN IF SCREEN IS CLEARED."
1830 PRINT"████THE TANK HAS A LIMITED RANGE. YOU MUST"
1840 PRINT"█GET CLOSE ENOUGH FOR THE EXPLODING"
1850 PRINT"█SHELL TO DESTROY THE TARGET."
1860 PRINT"████PRESS RETURN":POKE198,0
1870 GETA$:IFA$=CHR$(13)THEN1890
1880 GOTO 1870
1890 PRINT"█":POKEV+21,127
1920 PRINT"█████████████████TARGETS"
1930 PRINT"███ROCKET██████500 ████BAZOOK"
1940 PRINT"██████████HELI███████500████SEEKER"
1950 PRINT"█████████████TANK████████200"
1960 PRINT"█████████████████████RADAR████████500███████AGAIN Y/N"
1970 PRINT"██████████████████████TOWER████████1000":POKE198,0
1980 GETA$:IFA$="Y"THEN1670
1981 IFA$="N"THEN2000
1990 GOTO 1980
2000 SYS 39055
2005 IFPEEK(252)=255THEN70
2010 GOTO2002
21000 DATA0,0,150,0,0,2,130,0,0,0,0,0,0,127,0,0,255
21001 DATA255,255,255,255,255,255,255,255,127,255,255,255,255,255,127,0,26
21002 DATA0,0,0,0,0,0,0,0,0,0,100,0,70,0,119,255,255
21003 DATA255,255,255,255,255,255,255,255,255,255,127,127,247,0,0,0,0
21004 DATA0,0,0,255,0,0,0,0,14,46,255,191,255,255,255,255,255
21005 DATA255,255,255,255,255,255,255,255,255,255,255,0,0,0,0,0,0
21006 DATA0,0,0,0,0,0,0,0,0,132,0,255,255,255,255,255,255,255
21007 DATA255,255,255,255,255,255,255,255,255,16,0,150,0,0,0,130,0
21008 DATA0,0,0,0,0,127,0,0,255,255,255,247,255,255,183,255,255
21009 DATA127,255,255,255,255,255,191,0,154,0,0,0,0,0,0,0,0
21010 DATA0,0,100,0,132,0,247,255,255,255,255,255,255,255,255,255,255
21011 DATA255,255,127,127,247,0,128,0,0,0,0,0,255,0,0,0,0
21012 DATA140,46,255,189,255,255,255,255,255,255,255,255,255,247,255,255,255
21013 DATA255,255,255,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21014 DATA132,120,255,255,255,255,255,255,255,255,255,191,255,255,255,255,255
21015 DATA255,0,0,150,0,0,99,130,0,0,0,0,0,0,119,0,0
21016 DATA255,255,255,255,255,255,247,255,255,127,255,255,255,255,255,251,0
21017 DATA26,0,1,0,0,0,0,0,0,0,0,0,100,0,30,0,247,255
21018 DATA255,255,255,255,255,255,255,255,255,255,255,127,127,247,0,0,0
21019 DATA0,0,0,0,255,0,0,0,0,34,46,255,191,255,255,255,255
21020 DATA255,255,255,255,255,247,255,255,255,255,255,255,0,0,0,0,0
21021 DATA0,0,0,0,0,0,0,0,0,0,132,2,255,255,255,255,255,255
21022 DATA255,255,255,255,255,255,255,255,255,255,16,0,150,0,0,0,130
21023 DATA0,0,0,0,0,0,127,0,0,255,255,255,255,255,255,255,255
21024 DATA255,127,255,255,255,255,255,251,0,26,0,0,0,0,0,0,0
21025 DATA0,0,0,100,0,24,0,119,255,255,255,255,255,255,255,255,255
21026 DATA255,255,255,127,127,247,0,0,0,0,0,0,0,255,0,0,0
21027 DATA0,24,46,255,188,255,255,255,255,255,255,255,255,255,255,255,255
21028 DATA255,255,255,255,0,0,0,0,0,0,0,0,0,0,0,0,0
21029 DATA0,132,24,255,255,255,255,255,255,255,255,255,255,255,255,255,255
21030 DATA255,255,0,0,150,0,0,2,130,0,0,0,0,0,0,127,0
21031 DATA0,255,255,255,127,255,255,191,255,255,127,255,255,255,255,255,63
21032 DATA0,26,0,0,0,0,0,0,0,0,0,0,100,0,14,0,119
21033 DATA255,255,255,255,255,255,255,255,255,255,255,255,127,127,247,0,0
21034 DATA0,0,0,0,255,0,0,0,0,14,46,255,191,255,255,255
21035 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,0,0,0,0
21036 DATA0,0,0,0,0,0,0,0,0,0,132,0,255,255,255,255,255
21037 DATA255,255,255,255,255,255,255,255,255,255,255,16,0,150,0,0,64
21038 DATA130,0,0,0,0,0,0,127,0,0,255,255,255,255,255,255,255
21039 DATA255,255,127,255,255,255,255,255,255,0,154,0,0,0,0,0,0
21040 DATA0,0,0,0,100,0,94,0,247,255,255,255,255,255,255,255,255
21041 DATA255,255,255,255,127,127,247,0,0,0,0,0,0,0,255,0,0
21042 DATA0,0,20,46,255,189,255,255,255,255,255,255,255,255,255,255,255
21043 DATA255,255,255,255,255,0,0,0,0,0,0,0,0,0,0,0,0
21044 DATA0,0,132,16,255,255,255,255,255,255,255,255,255,255,255,255,255
21045 DATA255,255,255,0,0,150,0,0,97,130,0,0,0,0,0,0,127
21046 DATA0,0,255,255,255,127,255,255,255,255,255,127,255,255,255,255,255
21047 DATA127,0,26,0,65,0,0,0,0,0,0,0,0,100,0,96,0
21048 DATA119,255,255,255,255,255,255,255,255,255,255,255,255,127,127,247,0
21049 DATA0,0,0,0,0,0,255,0,0,0,32,46,255,255,255,255
21050 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,255,0,0,0
21051 DATA0,0,0,0,0,0,0,0,0,0,0,0,132,0,255,255,255,255
21052 DATA255,255,255,255,255,255,255,255,255,255,255,255,16,0,150,0,0
21053 DATA64,130,0,0,0,0,0,0,127,0,0,255,255,255,255,255,255
21054 DATA255,255,255,127,255,255,255,255,255,255,0,154,0,64,0,0,0
21055 DATA0,0,0,0,0,100,0,220,0,247,255,255,255,255,255,255,255
21056 DATA255,255,255,255,255,127,127,247,0,128,0,0,0,0,0,255,0
21057 DATA0,0,0,156,46,255,252,255,255,255,255,255,255,255,255,255,255
21058 DATA255,255,255,255,255,255,0,0,0,0,0,0,0,0,0,0,0
21059 DATA0,0,0,132,136,255,255,255,255,255,255,255,255,255,255,255,255
21060 DATA255,255,255,255,0,0,150,0,0,0,130,0,0,0,0,0,0
21061 DATA119,0,0,255,255,255,255,255,255,255,255,255,127,255,255,255,255
21062 DATA255,255,0,26,0,0,0,0,0,0,0,0,0,0,100,0,0
21063 DATA0,247,255,255,255,255,255,255,255,255,255,255,255,255,127,127,247
21064 DATA0,0,0,0,0,0,0,255,0,0,0,0,0,46,255,191,255
21065 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,0,0
21066 DATA0,0,0,0,0,0,0,0,0,0,0,0,132,0,255,255,255
21067 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,16,0,150,0
21068 DATA0,0,130,0,0,0,0,0,0,127,0,0,255,255,255,255,255
21069 DATA255,191,255,255,127,255,255,255,255,255,191,0,154,0,0,0,0
21070 DATA0,0,0,0,0,0,100,0,0,0,247,255,255,255,255,255,255
21071 DATA255,255,255,255,255,255,127,127,247,0,0,0,0,0,0,0,255
21072 DATA0,0,0,0,0,46,255,189,255,255,255,255,255,255,255,255,255
21073 DATA255,255,255,255,255,255,255,0,0,0,0,0,0,0,0,0,0
21074 DATA0,0,0,0,132,0,255,255,255,255,255,255,255,255,255,255,255
21075 DATA255,255,255,255,255,0,0,150,0,0,0,130,0,0,0,0,0
21076 DATA0,119,0,0,255,255,255,251,255,255,255,255,255,127,255,255,255
21077 DATA255,255,251,0,154,0,0,0,0,0,0,0,0,0,0,100,0
21078 DATA0,0,243,255,255,255,255,255,255,255,255,255,255,255,255,127,127
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21079 DATA247,0,0,0,0,0,0,0,255,0,0,0,0,0,46,255,191
21080 DATA255,255,255,255,255,255,255,255,255,239,255,255,255,255,255,255,0
21081 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,132,0,255,255
21082 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,255,16,0,158
21083 DATA0,32,32,162,0,0,0,0,0,0,127,0,0,255,255,255,255
21084 DATA255,255,255,255,255,127,255,255,255,255,255,255,0,154,0,160,0
21085 DATA0,0,0,0,0,0,0,100,0,100,0,247,255,255,255,255,255
21086 DATA255,255,255,255,255,255,255,127,127,247,0,160,0,0,0,0,0
21087 DATA255,0,0,0,0,100,46,255,189,255,255,255,255,255,255,255,255
21088 DATA255,255,255,255,255,255,255,255,0,0,0,0,0,0,0,0,0
21089 DATA0,0,0,0,0,132,100,255,255,255,255,255,255,255,255,255,255
21090 DATA255,255,255,255,255,255,0,0,0,0,16,0,0,16,0,0,16
21091 DATA0,0,16,32,0,252,128,3,255,0,3,255,0,11,255,128,43
21092 DATA255,160,42,170,160,42,170,160,84,168,84,84,0,84,84,0,84
21093 DATA84,0,84,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21094 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21095 DATA2,55,0,0,247,192,0,247,192,2,247,224,10,247,232,10,170
21096 DATA168,10,170,168,21,42,21,21,0,21,21,0,21,21,0,21,0
21097 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21098 DATA0,0,0,0,0,0,0,0,0,0,0,60,0,0,255,0,85
21099 DATA255,0,85,255,0,0,255,32,2,170,128,2,170,128,21,85,80
21100 DATA85,85,84,87,255,212,21,85,80,0,0,0,0,0,0,0,0
21101 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21102 DATA0,0,0,0,0,0,0,60,0,0,255,0,0,255,85,32,255
21103 DATA85,0,255,0,2,170,128,2,170,128,5,85,84,21,85,85,23
21104 DATA255,245,5,85,84,0,0,0,0,0,0,0,0,0,0,0,0
21105 DATA0,0,0,0,0,254,129,0,64,193,128,192,225,193,192,121
21106 DATA227,192,121,247,248,61,255,252,31,255,254,31,255,255,15,255,248
21107 DATA3,255,240,7,255,224,15,255,254,31,255,252,63,255,248,127,255
21108 DATA240,255,255,192,0,124,224,0,120,112,0,112,56,0,96,24,0
21109 DATA64,0,49,0,4,0,0,4,0,0,92,0,0,124,0,30,252
21110 DATA0,26,255,128,14,255,64,6,254,64,3,94,0,3,255,0,0
21111 DATA229,128,0,116,0,0,92,0,0,76,0,0,4,0,0,4,0
21112 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,198,0
21113 DATA0,0,0,0,0,42,170,0,42,170,0,0,128,0,0,128,2
21114 DATA15,240,11,63,240,3,245,255,3,245,255,195,250,255,255,250,255
21115 DATA255,255,255,0,63,252,0,12,48,0,255,255,0,0,0,0,0
21116 DATA0,0,0,0,0,0,0,0,0,0,0,32,255,255,252,255,255
21117 DATA252,200,136,140,200,136,140,200,136,140,200,136,140,200,136,140,200
21118 DATA136,140,200,136,140,255,255,252,255,255,252,0,32,0,0,32,0
21119 DATA0,32,0,0,32,0,0,32,0,1,85,0,5,85,64,21,85
21120 DATA80,85,85,84,85,85,84,255,2,170,128,10,170,160,42,170,168
21121 DATA170,170,170,10,170,160,4,0,16,4,0,16,4,0,16,4,0
21122 DATA16,4,0,16,15,255,240,15,255,240,15,255,240,15,255,240,4
21123 DATA0,16,5,0,16,4,64,16,4,16,16,4,4,16,4,1,16
21124 DATA4,0,80,57,0,16,0,0,84,0,0,84,0,0,84,0,0
21125 DATA168,0,0,168,0,0,168,0,0,168,0,0,168,0,0,168,0
21126 DATA0,168,0,0,168,0,0,168,0,0,168,0,0,168,0,3,51
21127 DATA0,15,51,192,15,51,192,15,51,192,15,51,192,15,51,192,239
21128 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21129 DATA0,0,21,64,0,85,127,0,85,127,0,85,64,10,170,160,42
21130 DATA170,170,175,255,250,175,255,250,42,170,170,10,170,168,0,0,0
21131 DATA0,0,0,0,0,0,0,0,0,0,0,0,41,0,0,0,0
21132 DATA170,0,2,170,128,10,170,160,42,255,168,43,255,232,171,255,234
21133 DATA175,255,250,175,215,250,175,85,250,175,85,250,175,85,250,175,215
21134 DATA250,175,255,250,171,255,234,43,255,232,42,255,168,10,170,160,2
21135 DATA170,128,0,170,0,0,0,0,230,0,0,0,0,80,0,1,85
21136 DATA64,5,85,80,21,255,84,23,255,212,87,255,213,95,255,245,95
21137 DATA255,245,95,170,245,95,170,245,95,170,245,95,235,245,95,255,245
21138 DATA87,255,213,23,255,212,21,255,84,5,85,80,1,85,64,0,85
21139 DATA0,0,0,0,48,0,0,0,0,0,0,0,0,16,0,0,16
21140 DATA0,0,80,0,1,83,9,85,0,41,85,60,169,85,3,41,85
21141 DATA252,9,85,0,0,1,83,0,0,80,0,0,16,0,0,16,0
21142 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21143 DATA230,0,0,0,0,0,0,0,0,0,0,0,0,10,0,0,202
21144 DATA128,0,0,170,144,60,170,148,192,170,149,63,170,148,0,170,144
21145 DATA202,128,0,10,0,0,0,0,0,0,0,0,0,0,0,0,0
21146 DATA0,0,0,0,0,0,0,0,0,0,0,0,32,221,164,132
21147 DATA4,64,0,255,233,0,0,0,64,164,180,246,253,255,255,255,255
21148 DATA255,255,255,0,255,255,255,220,255,255,255,255,32,32,32,97,0
21149 DATA0,0,32,0,32,64,32,32,0,0,32,223,255,255,255,255,255
21150 DATA255,255,127,255,191,255,255,255,255,255,0,0,158,0,0,35,130
21151 DATA0,0,0,0,0,0,119,0,0,255,255,255,255,255,255,191,255
21152 DATA255,127,255,255,255,255,255,191,0,26,0,1,0,0,0,0,0
21153 DATA0,0,0,180,0,10,0,247,255,255,255,255,255,255,255,255,255
21154 DATA255,255,255,127,127,255,0,0,0,0,0,0,0,0,255,0,0,0
21155 DATA0,42,46,255,191,255,255,255,255,255,255,255,255,255,255,255,255
21156 DATA255,255,255,255,0,1,0,0,0,0,0,0,0,0,0,0,0
21157 DATA0,132,10,255,255,255,255,255,255,255,255,255,191,255,255,255,255
21158 DATA255,255,16,0,158,0,0,98,130,0,0,0,0,0,0,127,0
21159 DATA0,255,255,255,255,255,255,255,255,255,127,255,255,255,255,255,255
21160 DATA0,154,0,64,0,0,0,0,0,0,0,180,0,254,0,247
21161 DATA255,255,255,255,255,255,255,255,255,255,255,255,127,127,247,0,0
21162 DATA0,0,0,0,255,0,0,0,0,190,46,255,254,255,255,255
21163 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,0,0,0,0
21164 DATA0,0,0,0,0,0,0,0,0,0,132,56,255,255,255,255,255
21165 DATA255,255,255,255,255,255,255,255,255,255,255,0,0,158,0,0,96
21166 DATA130,0,0,0,0,0,0,127,0,0,255,255,255,127,255,255,255
21167 DATA255,255,127,255,255,255,255,255,123,0,26,0,64,0,0,0,0
21168 DATA0,0,0,180,0,104,0,119,255,255,255,255,255,255,255,255,255
21169 DATA255,255,255,255,127,127,255,0,0,0,0,0,0,0,255,0,0
21170 DATA0,0,40,46,255,191,255,255,255,255,255,255,255,255,255,255,255
21171 DATA255,255,255,255,255,0,0,0,0,0,0,0,0,0,0,0,0
21172 DATA0,0,132,0,255,255,255,255,255,255,255,255,255,255,255,255,255
21173 DATA255,255,255,16,0,158,0,0,0,130,0,0,0,0,0,0,127
21174 DATA0,0,255,255,255,255,255,255,150,255,255,127,255,255,255,255,254
21175 DATA191,0,154,0,0,0,0,0,0,0,0,0,0,180,0,148,0
21176 DATA246,255,255,255,255,255,255,255,255,255,255,255,255,127,127,255,0
21177 DATA128,0,0,0,0,0,255,0,0,0,0,140,46,255,188,255,255
21178 DATA255,255,255,255,255,255,255,222,255,255,255,255,255,255,0,0,0
21179 DATA0,0,0,0,0,0,0,0,0,0,0,132,144,255,255,255,255
21180 DATA255,255,255,255,255,190,255,255,255,255,255,255,0,0,158,0,0
21181 DATA2,130,0,0,0,0,0,0,127,0,0,255,255,255,255,255,255
21182 DATA255,255,255,127,255,255,255,255,255,127,0,26,0,0,0,0,0
21183 DATA0,0,0,0,0,180,0,10,0,247,255,255,255,255,255,255,255
21184 DATA255,255,255,255,255,127,127,255,0,0,0,0,0,0,0,255,0
21185 DATA0,0,0,2,46,255,191,255,255,255,255,255,255,255,255,255,239
21186 DATA255,255,255,255,255,255,0,0,0,0,0,0,0,0,0,0,0
21187 DATA0,0,0,132,2,255,255,255,255,255,255,255,255,255,255,255,255
21188 DATA255,255,255,255,16,0,158,0,0,1,130,0,0,0,0,0,0
21189 DATA127,0,0,255,255,255,255,255,255,255,255,255,127,255,255,255,255
21190 DATA255,251,0,154,0,1,0,0,0,0,0,0,0,0,180,0,176
21191 DATA0,247,255,255,255,255,255,255,255,255,255,255,255,255,127,127,247
21192 DATA0,0,0,0,0,0,0,255,0,0,0,0,176,46,255,191,255
21193 DATA255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,0,0
21194 DATA0,0,0,0,0,0,0,0,0,0,0,0,132,128,255,255,255
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VDU

by Alastair Scott

This program, for any Amstrad CPC, provides a *VDU* command like on the BBC micro. The syntax is *|VDU,a,b,c...* Up to 64 parameters can be passed.

For example, *|VDU,4,1,15,3,65* sets *Mode 1, Pen 3* and prints 'A'.

```
100 REM VDU by Alastair Scott
110 MODE 1:MEMORY &A63F
120 FOR a=&A640 TO &A674
130 READ b$:POKE a,VAL("&"+b$)
140 NEXT:CALL &A640:PRINT"|VDU command O
K."
```

```
150 DATA 01,49,A6,21,75,A6,C3,D1,BC,4E
160 DATA A6,C3,52,A6,56,44,D5,00,FE,00
170 DATA C8,FE,01,28,16,47,05,DD,23,DD
180 DATA 23,10,FA,47,DD,7E,00,CD,5A,BB
190 DATA DD,2B,DD,2B,10,F4,C9,DD,7E,00
200 DATA C3,5A,BB
```

Money Maker

by D G Evans

This program for any Spectrum will generate money. £10 notes to be specific. Just type it in, and it can be easily converted to other machines, run the program and you'll see what I mean. A little effort on your part and you could soon be rolling in the brown notes.

```
  10 REM Money Maker
  20 CLS : PRINT  INK 6; PAPER 2;"      M
oney Maker Utility    "
  30 PRINT : FLASH 1: FOR f=1 TO 85
  40 READ b
  50 PRINT CHR$ (b);
  60 NEXT f
  70 DATA 87,104,121,32,110,111,116,32,1
15,101,110,100,32,105,110,32,121,111,117
,114,32
  80 DATA 115,104,111,114,116,32,112,114
,111,103,114,97,109,115,32,102,111,114,3
2,66,121,116,101,115,32,97,110,100,32,80
,105,101,99
  90 DATA 101,115,32,97,110,100,32,101,9
7,114,110,32,121,111,117,114,115,101,108
,102,32,97,32,116,101,110,110,101,114,32
,63
```

Status

by Alastair Scott

After typing in and correcting any errors, this program for any Amstrad CPC should be called by entering *|S*.

Three five digit numbers are now produced. They are as follows:

1. Length of the Basic program in memory.
2. Length of the variable area.
3. Free memory.

```
100 ' Status
110 ' by Alastair Scott
120 cs=0:MODE 2:MEMORY &9FFF
130 FOR addr=&A000 TO &A099
140 READ byte$:POKE addr,VAL("&"+byte$)
150 cs=cs+PEEK(addr)
160 NEXT
170 IF cs<>18108 THEN PRINT CHR$(7)"DATA
 ERROR!":END
180 CALL &A000:PRINT"|S command OK.":END
190 DATA 01,18,A0,21,99,A0,CD,D1,BC,CD
200 DATA 00,B9,F5,3A,02,C0,A7,CC,7A,A0
210 DATA F1,C3,0C,B9,1D,A0,C3,1F,A0,D3
220 DATA 00,2A,66,AE,ED,5B,64,AE,ED,52
230 DATA CD,44,A0,2A,6C,AE,ED,5B,66,AE
240 DATA ED,52,CD,44,A0,2A,5E,AE,ED,5B
250 DATA 6C,AE,ED,52,CD,44,A0,C9,11,10
260 DATA 27,CD,67,A0,11,E8,03,CD,67,A0
270 DATA 11,64,00,CD,67,A0,11,0A,00,CD
280 DATA 67,A0,11,01,00,CD,67,A0,3E,20
290 DATA C3,5A,BB,AF,37,3F,ED,52,38,03
300 DATA 3C,18,F7,19,C6,30,E5,CD,5A,BB
310 DATA E1,C9,21,83,AE,22,20,A0,22,30
320 DATA A0,21,81,AE,22,24,A0,21,89,AE
330 DATA 22,2C,A0,22,3C,A0,21,7B,AE,22
340 DATA 38,A0,C9,00,00,00,00,00,00,00
```

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With Kenn Garroch

The Amsdos hex

Alastair Scott, of Grangemouth, in Stirlingshire, writes:

Q I would be grateful if you could help me with the AMSDOS disc format.

On examining the directory entry with a disc sector editor, I get a display such as:

```
00 45 4E 56 45 4C 4F 50
45 42 41 53 00 00 00 4A
20 69 79 7H 7B TE 80 83
84 85 00 00 00 00 00 00
```

I realise that the highlighted hex digits refer to the track sector that the file (in this case *Envelope.Bas*) is stored at. How can you convert these digits into track and sector numbers?

A CP/M disc (for this is what it is) is not set out in the way you might think. The file is split into portions that will fit into the available places on the disc. The directory tells the operating system where the various pieces are. The directory entry is read as follows.

Byte	Contents	Meaning
0	00	Set to 0 if file is valid, E5 if erased
1	E	
2	N	
3	V	Eight
4	E	byte
5	L	filename
6	O	
7	P	
8	E	
9	B	Three byte
10	A	file
11	S	extension
12	00	Extent
13	00	s1
14	00	s2
15	4A	Number of records in this extent
16	26	The
17	69	rest
18	79	are
19	7A	allocation
20	7B	units
21	7E	which
22	80	are
23	83	set
24	84	to
25	85	zero
26	00	if
27	00	they
28	00	are
29	00	unused
30	00	
31	00	

These 32 bytes tell the operating system all of the information it needs to know about the file. The filename and extension are obvious. Files are stored on disc as records of 128 bytes, each allocation unit represents 8 records, and there is space in one directory entry for 16 allocation units, hence 16*8*128=16384 bytes.

The extent entry is used when the file exceeds 16K. If this happens, another extent is opened up creating a new directory entry with the same filename and type but with the extent number set to one (or more if the file is really big, calling for more directory entries).

The allocation units are stored in the directory entry from byte 16 to 31 (16 entries as above) and each refers to a block of eight sectors each sector being 128 bytes long. The blocks are numbered sequentially from track 0 sector 0 through the last track and sector (depending on the density).

So to find where a file is stored on disc, look at the allocation units, and then read the eight consecutive sectors that each one points to. In your example, the first block is stored in block 26 (38 decimal) or sector 304 (38x8); just divide by the number of sectors per track to get the track number, the remainder is the sector on this track where the file starts. At the end of this block, use the next allocation number to work out the position of the next block.

When you get to the last block, it may not be full, the remainder of the 'number of records' entry divided by 8 will tell you how many records are used.

The numbers s1 and s2 are used by the system for something but I don't know what, the number of records in the extent is exactly that on single density system (such as the 6128) but is a little more convoluted on double density systems.

Go to Print

P M Rainford Jnr, of Llanbedr, in Clwyd, writes:

Q Please could you tell me what is happening in this short program on the Commodore 64?

```
10 PRINT" "TIME
20 GOTO 10
```

A The Commodore 64 has a built-in clock that starts counting from zero when the machine is turned on. This 'Jiffy clock', as it is known, counts up at 60 times a second (even on British machines where the mains frequency is 50Hz) and is held in three bytes of memory, 160, 161, 162, where 162 changes the fastest. _Print 65536*Peek (160)+256*Peek(161)+Peek (162)_ is the same as _Print Ti_. The Commodore 64 only recognises the first two characters of any variable name so _Print Time or Print Tide_ are the same as _Print Ti_, the _Me_ or _De_ being irrelevant to the machine.

The internal clock is fairly accurate but is somewhat dependent on whether any input/output operations are going on. Both the tape and disc will stop the clock when they are being used leading to inaccuracies.

_Ti_ is also what is known as a system variable, ie, it is reserved for system use and updated by the system. Other system variables are _Ti$_, which can be used to set the jiffy clock to read the time of day.

_Ti$="083031"_ sets the clock to 8.30 and 31 seconds making
Ti:=1837860 [((18*60*60)+(30*60)+31)*60 jiffy's].

Charts

Top Twenty

1	(5)	Go for Gold	**Americana**
2	(3)	Dragon's Lair	**Software Projects**
3	(1)	Super Cycle	**US Gold**
4	(4)	Speed King	**Mastertronic**
5	(6)	Thrust	**Firebird**
6	(12)	Ninja	**Mastertronic**
7	(–)	Trivial Pursuit	**Domark**
8	(2)	Dan Dare	**Virgin**
9	(8)	Ghosts and Goblins	**Elite**
10	(10)	ACE	**Cascade**
11	(11)	Ninja Master	**Firebird**
12	(7)	Kane	**Mastertronic**
13	(–)	Formula One Simulator	**Mastertronic**
14	(17)	Warhawk	**Firebird**
15	(–)	Parallax	**Ocean**
16	(9)	Knight Rider	**Ocean**
17	(20)	Green Beret	**Imagine**
18	(–)	Leaderboard	**US Gold**
19	(16)	Kick Start	**Mastertronic**
20	(18)	Nightmare Rally	**Ocean**

Figures compiled by Gallup/Microscope

In the lap of the Gods

David Wallin has news of multi-user game Gods, with a special offer for Popular readers

A while back we looked at a couple of BB multi-user games, including *Gods*. This week we have a special *Gods* offer for readers of this column, so it's time to look at the game in more detail. There is a personal bias in this, I must admit; *Gods* is my favourite multi-player adventure, despite its joining-on fee of £23.

Accessing Gods

Gods can be accessed by any 300/300 or 1200/75 terminal, although I find that 1200/75 works a lot better than 300/300. The number is 01-994 9119 and the protocol 8-bits, no parity and one stop bit (standard BB protocol).

Free demo mode

To see if you like *Gods* (and you probably will), you can log on as a guest. From the first menu you go to the Play option and enter guest when asked to, and then follow any on-screen instructions.

Most of the other people I have met on *Gods* are friendly and generally peaceable. There is, though, one thing that can turn even the most friendly people to murder, that is an annoying guest.

Guests have a habit of trying to kill other people, as there are plenty of weapons about for the violent people out there to find and kill with, but most other players are peaceful and don't kill unless forced to.

Other players are also helpful to the beginner. When I first started, many others offered to give me guided tours of the area, totally free, to help me. They also offered tips when you are stuck which is useful. It was the other players who taught me about 'valuing' items (see below). Offering items to the *Gods* (also see below), performing the 'ritual' in Blob's temple and other things that had at first baffled me.

Treasure

When you find treasure, you can value it to find what it's worth. When you type *Value (items)*, a little character appears, looks at it and tells you its worth in both magic points and gold.

Treasure can be offered to a God in his temple. Having asked the guard to take you there, you can type *Offer (item)* to give the item to the God. What happens next depends on the value of the item. If when valuing it you were told that the Gods would give you zero for it then the Gods will be cross with you. If, however, the item is valued above zero, you will be given its value in magic points (called magical reserves).

The more items you offer, the better your rank will be. You start as Scum, proceed to Salt-Of-The-Earth, then to Second Class Citizen, eventually, through Monk and Priest, to finally become a God. There are many ranks, and the above are just examples. At the time of writing I am a Second Class Citizen, under the persona of Communicator.

The 'ritual' mentioned above is a method of getting a lot of points, even though you may not have much treasure yourself. To find out more you'll have to play *Gods*.

All good adventures have a maze, and *Gods* is no exception. In *Gods* the maze is the Kashab, and it's easy as anything to get lost in it. If you do get lost in the Kashab, then keep typing *Out*. Also there is a forest, where you can get lost, but it is quite a bit easier to find your way out of the forest than the Kashab.

At present, there are only two spells available; *Where* and *Summon*. They do exactly what you would expect. *Where* tells you where an object/person is. *Summon* will bring a person to you. More spells are on their way. Other commands include *Fight, Use, Kill, Get, Value, Offer, Kiss, Bug, Cry, Say, Shout, Help, Mount, Ring Bell, Guard, Out* and many, many, more. The command *Who* will tell you who is currently playing the game.

The Bulletin Board

Running alongside *Gods* is a multi-user Bulletin Board. At present this is a very crude messaging system, where you can leave other players messages, but *Gods* is now running on a new computer and an upgraded BB is promised.

Gods – the background

Gods is run by three people, Tiger, Major Malfunction (The Major) and Lucy. They form LOTG (Lap Of The Gods). Tiger, who wrote the software, built the hardware, etc, does most of the running.

Until recently, *Gods* was running on a 68000 Xenix machine, now it has been upgraded to Uniplus, on a 'home-made' computer, consisting of bought-in boards. The *Gods* software (and hardware) is available for sale to budding MUG sysops, but don't expect it to come cheap! Also LOTG will write custom games to your own requirements and sell a multi-user Bulletin Board system.

The charges on *Gods* are likely to change soon and an hourly playing charge be implemented when the game is finished, so you'd better join soon and make the most of the 'free' access time available.

Joining Gods

To register you send your £23 to LOTG with some information about your computer and modem. What you must do to register can be found out by Typing *H* at the first menu.

Special Offer

As a reader of *Popular Computing Weekly's* Communications feature, you are entitled to a discount of £6 when joining *Gods*. The cost for a *Popular* reader to join *Gods* is only £19.95 (including Vat).

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2) The reference dis/PCW/001.
3) The volume and issue numbers of this copy of the magazine.

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Amiga

Program *Instant Music* **Type** Utility **Micro** Amiga **Price** £29.95 **Supplier** Ariolasoft, 68 Long Acre, London WC2E 9JH.

Program *Archon II* **Type** Arcade/Strategy **Micro** Amiga **Price** £29.95 **Supplier** Arioloasoft, 68 Long Acre, London WC2E 9JH.

Program *Adventure Construction Set* **Type** Utility **Micro** Amiga **Price** £29.95 **Supplier** Ariolasoft, 68 Long Acre, London WC2E 9JH.

Program *Skyfox* **Type** Arcade **Micro** Amiga **Price** £29.95 **Supplier** Ariolasoft, 68 Long Acre, London WC2E 9JH.

Program *Arctic Fox* **Type** Arcade **Micro** Amiga **Price** **£29.95** **Supplier** Ariolasoft, 68 Long Acre, London WC2E 9JH.

Amstrad CPC

Program *The Inheritance (Panic in Las Vegas)* **Type** Adventure **Micro** Amstrad CPC **Price** £9.95 (tape) £14.95 (disc) **Supplier** Infogrames, Mitre House, Abbey Road, Enfield, Middx EN1 2RQ.

Program *Questor* **Type** Arcade Adventure **Micro** Amstrad CPC **Price** £8.95 (tape) £13.95 (disc) **Supplier** Cascade Games, Harrogate, North Yorkshire.

Program *Nemesis Adventures* **Type** Adventure **Micro** Amstrad CPC **Price** £13.95 (disc only) **Supplier** Advantage, 33 Malyns Close, Chinnor, Oxon OX9 4EW.

Program *Advantage C* **Type** Language Compiler **Micro** Amstrad CPC **Price** £39.95 (disc only) **Supplier** Advantage, 33 Malyns Close, Chinnor, Oxon OX9 4EW.

Program *Virgin Atlantic Challenge* **Type** Arcade **Micro** Amstrad CPC **Price** £8.95 **Supplier** Virgin Games, 2/4 Vernon Yard, Portobello Road, London W11 2DX.

Amstrad PCW

Program *Advantage C* **Type** Language Compiler **Micro** Amstrad PCW **Price** £39.50 **Supplier** Advantage, 33 Malyns Close, Chinnor, Oxon OX9 4EW.

Atari

Program *Raid Over Moscow* **Type** Arcade **Micro** Atari XL/XE **Price** £9.99 (tape) £14.99 (disc) **Supplier** US Gold, Unit 2/3, Holford Way, Holford, Birmingham B6 7AX.

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Commodore 64

Program *Asterix and the Magic Cauldron* **Type** Arcade **Micro** Commodore 64 **Price** £9.95 (tape) £14.95 (disc) **Supplier** Melbourne House, 60 High Street, Hampton Wick, Kingston Upon Thames, Surrey KT1 4DB.

Program *Orpheus in the Underworld* **Type** Arcade **Micro** Commodore 64 **Price** £1.99 **Supplier** Alpha-Omega, CRL Group, 9 Kings Yard, Carpenters Road, London E15 2HD.

Program *Robobolt* **Type** Arcade **Micro** Commodore 64 **Price** £1.99 **Supplier** Alpha-Omega, CRL Group, 9 Kings Yard, Carpenters Road, London E15 2HD.

Pick of the week

Deus ex Machina

Program *Deus ex Machina* **Type** Weird Arcade **Micro** Amstrad CPC **Price** £8.95 **Supplier** Nu Wave, CRL House, 9 Kings Yard, Carpenters Road, London E15 2HD.

You have to hand it to the guys at Automata – they have their moments.

I still miss Christian Penfolds displaying his manhood in that baggy pink jogging suit every Microfair – thinly disguised as the Pi-man.

But Automata's creative tool, the man with his feet firmlu on the artistic and ideological tiller was always Mel Croucher.

A man of many opinions, whose documented thoughts start at 'semi-visionary' move hastily through 'well observed' and, more often than not, don't stop 'till they get to 'crass' – love him or hate him, the guy has imagination. And as far as computer software goes, that imagination reached its pinicle with *Deus ex Machina*.

More like a concept album than a compilation, *Deus* is a collection of fairly original, but simple arcade games linked together by their abstract futurist setting. This alone would be of interest, but the action proceeds along with a synchronised soundtrack of words (credits include Jon Pertwee and Frankie Howerd) and music (Croucher).

The result had our office full of amazed people at one time – but commercially, it was a flop.

Who knows why, but it's out now on Amstrad CPC and MSX formats, marketed by CRL's Nu Wave label. At this price a bargain, go out and grab yourself a piece of computing history.

Program *Warhawk* **Type** Arcade **Micro** Commodore 64 **Price** £1.99 **Supplier** Firebird, 64–67 New Oxford Street, London WC1 1PS.

Program *Dante's Inferno* **Type** Arcade/Adventure **Micro** Commodore 64 **Price** £9.95 **Supplier** Beyond, 64–67 New Oxford Street, London WC1.

I had no idea that mediaeval scholars used PCW 8256s. But here we are, at the beginning of an epic and terrifying journey through the nine circles of Hell, and where do we start? Limbo.

Well, obviously Dante knew a thing or two, and his classic work *Inferno* has now received the ultimate acolade the 20th century can give a literary masterpiece – along with such exalted company as *Adrian Mole* and the *Fourth Protocol* for instance – in that it has become the subject of a computer game.

Programmed by Denton Designs (now minus founder members Cain and Everett), *Inferno* has you controlling 'pilgrim' (dressed, as all good pilgrims are, in raggedly cut hessian) through the nine circles of Hell to reach Purgatory on the other side – which is where some would say Beyond have been for quite some time.

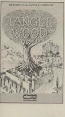
The game is really a series of mazes and puzzles, each maze inhabited by different creatures and hazards, with problems to solve at almost every step.

The graphics are well designed and the renaissance type sound track is refreshingly different – however, the unkind soul that shouted, "It's like Sabre Wulf with knobs on," from the back of the office, had a point.

No, well presented and atmospheric though this particular arcade adventure is, it is not the program to pull Beyond out of the doldrums. But just wait 'till you see *Infodroid* and *Star Trek*.

Dragon

Program *Tanglewood* **Type** Adventure **Micro** Dragon/Tandy CoCo 32K **Price** £5.96 **Supplier** Microdeal, PO Box 68, St Austell, Cornwall PL25 4YB.



Program *Wizards Quest* **Type** Arcade **Micro** Dragon/Tandy CoCo 32K **Price** £5.95 **Supplier** Microdeal, PO Box 68, St Austell, Cornwall PL25 4YB.

Program *Cuthbert and the Golden Chalice* **Type** Arcade **Micro** Dragon/Tandy CoCo 32K **Price** £5.95 **Supplier** Microdeal, PO Box 68, St Austell, Cornwall PL25 4YB.

QL

Program *War in the East (Scenario 1: Barbarossa)* **Type** Strategy **Micro** QL **Price** £19.95 **Supplier** TK Computerware, Stone Street, Stanford, Ashford, Kent TN25 6DF.

Program *War in the East (Scenario 2: Stalingrad)* **Type** Strategy **Micro** QL **Price** £19.95 **Supplier** TK Computerware, Stone Street, Stanford, Ashford, Kent TN25 6DF.

Program *War in the East (Scenario 3: Destruction of Army Group Centre)* **Type** Strategy **Micro** QL **Price** £19.95 **Supplier** TK Computerware, Stone Street, Stanford, Ashford, Kent TN25 6DF.

Program *War in the East (Scenarios 1–3)* **Type** Strategy **Micro** QL **Price** £39.95 **Supplier** TK Computerware, Stone Street, Stanford, Ashford, Kent TN25 6DF.

Spectrum

Program *3D Game Maker* **Type** Utility **Micro** Spectrum **Price** £8.95 **Supplier** CRL Group, 9 Kings Yard, Carpenters Road, London E15 2HD.

Program *Oblivion* **Type** Ar-

Program *Bombscare* **Type** Arcade/Adventure **Micro** Spectrum **Price** £1.99 **Supplier** Firebird, 64–67 New Oxford Street, London WC1A 1PS.

Program *The Happiest Days of Your Life* **Type** Arcade/Adventure **Micro** Spectrum **Price** £1.99 **Supplier** Firebird, 64–67 New Oxford Street, London WC1A 1PS.

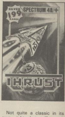
Program *Dr What* **Type** Adventure **Micro** Spectrum **Price** £7.95 **Supplier** CRL, 9 Kings Yard, Carpenters Road, London E15 2HD.

Program *3D Starstrike* **Type** Arcade **Micro** Spectrum **Price** £2.99 **Supplier** £2.99 Classics, Elite, Anchor House, Anchor Road, Aldridge, Walsall WS9 8PW.

Program *Thrust* **Type** Arcade **Micro** Spectrum **Price** £1.99 **Supplier** Firebird, 64–67 New Oxford Street, London WC1A 1PS.

Here it is at last – the Spectrum conversion of that number one top selling second cousin of *Asteroids* and *Gravitar* we were all going crazy about earlier in the year – *Thrust*.

The graphics are similar rather than identical, but the



Not quite a classic in its own right, but still worth getting.

Program *Prodigy* **Type** Arcade/Adventure **Micro** Spectrum **Price** £7.99 **Supplier** Electric Dreams, 31 Carlton Crescent, Southampton SO1 2EN.

Prodigy is its name. "A game which demands compassion, guts and intelligence in ways no other game does." You bet, since your tasks include cleaning, feeding and generally protecting a human baby, with you (Solo – a synthetic man . . . and no, it doesn't mean you wear a lot of polyester) attempting to lead the kid through the laboratories of the machine sorcerer Wardlock. Seeing as it is infested with sundry genetic horrors

because 'you're not grown up' or 'not old enough to come to the pub' and look what they get up to when they get there! Here's your chance to find out what it's really like in those smoke filled haunts of adulthood. The opportunity to see how good you are at these ADULT?? games.
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The selling game

What's the difference between a budget game and a full price game? Okay, I'll run that one past you again – what's the difference between a budget game and a full price game, apart from seven or eight quid?

I see this is confusing you; let's try it another way. Was the last full price game you bought five times better than the last budget game you bought? That's one way of looking at it, yet my pet marketing expert tells me the real difference between full price and budget is actually where the product is sold.

When something as crazy as that may well have several grains of truth in it, maybe it's time to examine what's going on.

When the games market started, no-one had much idea about anything and the concept of 'price points' for computer software was still a twinkle in the eyes of as yet unappointed marketing managers.

Experienced business people had yet to take home computers seriously, and the wacky entrepreneurial/programmer types just cranked the stuff out for what they thought would sell. Looking at some 3½ year old *Populars*, that opinion seemed to vary from £4 to £10.

However, things started to change when glossy ads and full colour cassette inlays were invented – games were suddenly a youth culture industry. Enter the professionals.

Professionals know that for each kind of product there is a price which the consumer likes. Not too expensive – as you need to maximise your profit without losing too many sales. But there again, not too cheap, or the consumer will believe the product to be worthless. This is known as a price point.

For software, this appeared to be around £9 for Spectrum games and £10 for Commodore 64/Amstrad CPC (after all, they paid more for their machines, didn't they?).

As the industry boomed, everyone who programmed for the right machines prospered and was happy. Then in 1984 came budget software, pioneered by Mastertronic. The professionals laughed.

In 1986, one in five games sold is a Mastertronic game, four out of 10 games sold is a budget title and this time next year it'll be at least six out of 10. So what's gone wrong with the status quo?

What Mastertronic realised first – and others are realising now – is that what was considered the industry, price point is just too high. The punters (that's you and me) are reluctant to pay out large sums of money for a product of indeterminate quality.

High prices do not guarantee high quality (eg, *The Great Space Race*), so why bother? At least if a £1.99 game is a dud, you haven't blown a month's pocket money.

Now that budget software has developed so that it consistently overlaps with 'full price' in terms of quality, there are even more problems.

An 'industry figure' I was talking to recently was mystified. "They seem to be selling a full price product at budget prices." I would put it the other way around. As the quality of budget software increases, it is harder for other companies to justify the 'traditional' price tag of a tenner.

Computers are no longer 'whoosh goes the rocket' gadgets – they are simply everyday consumer items, and twice the price of an LP is too much for a single computer game, unless the quality is considerably above that of budget level – and that is seldom the case (adventures and complex strategy games may be an exception here).

"But if we sold our products cheaper, we would go out of business," I hear the cry.

Well, I don't see Mastertronic rapidly going down the tubes. The fact is that lower prices would mean increased sales, less copying and more interest in the hobby.

There will always be the *Elites* of this world – well worth the money – but as far as the run-of-the-mill releases are concerned, the average price should be lower. How about it, then? Never mind the profit margin, just feel that turnover.

John Cook

NEXT WEEK

Special Supplement Micros and Music

The music supplement is packed with reviews of the latest products – the Spectrum Midi synthesiser/sampler/drum machine from Ram Electronics, Cheetah's sound sampler, Kuma's *K-Minstrel* music editor, and the Amstrad *Advanced Music System*. Plus news from the States of all the forthcoming Commodore and Atari music packages.

Hardware

The reviews of Comx's PL80 printer/plotter and the Fantastick 2 joystick, which had to be omitted from this issue due to lack of space, will be appearing in the October 2 issue. The Comx PL80 is both Commodore and PC compatible, while the joystick can be used with a wide range of micros.

Star Glider

At long last, Rainbird's *Star Glider* is finished and ready for release. We bring you a full review.

Competition

The last science fiction movie stills for you to identify in our great autumn giveaway.

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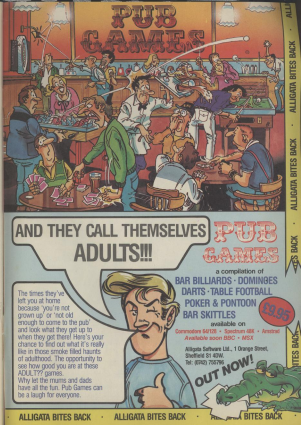
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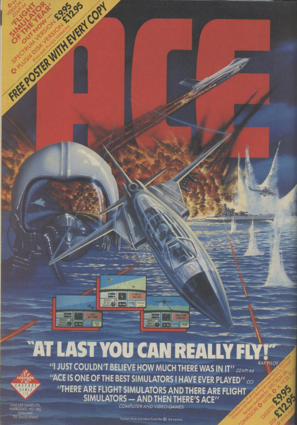

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